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THE
JOURNAL

OF THE

ROYAL GEOGRAPHICAL SOCIETY

OF

25228

LONDON.

910.5
J.R.G.S

VOLUME THE TWENTY-SECOND.



LONDON:
JOHN MURRAY, ALBEMARLE STREET.

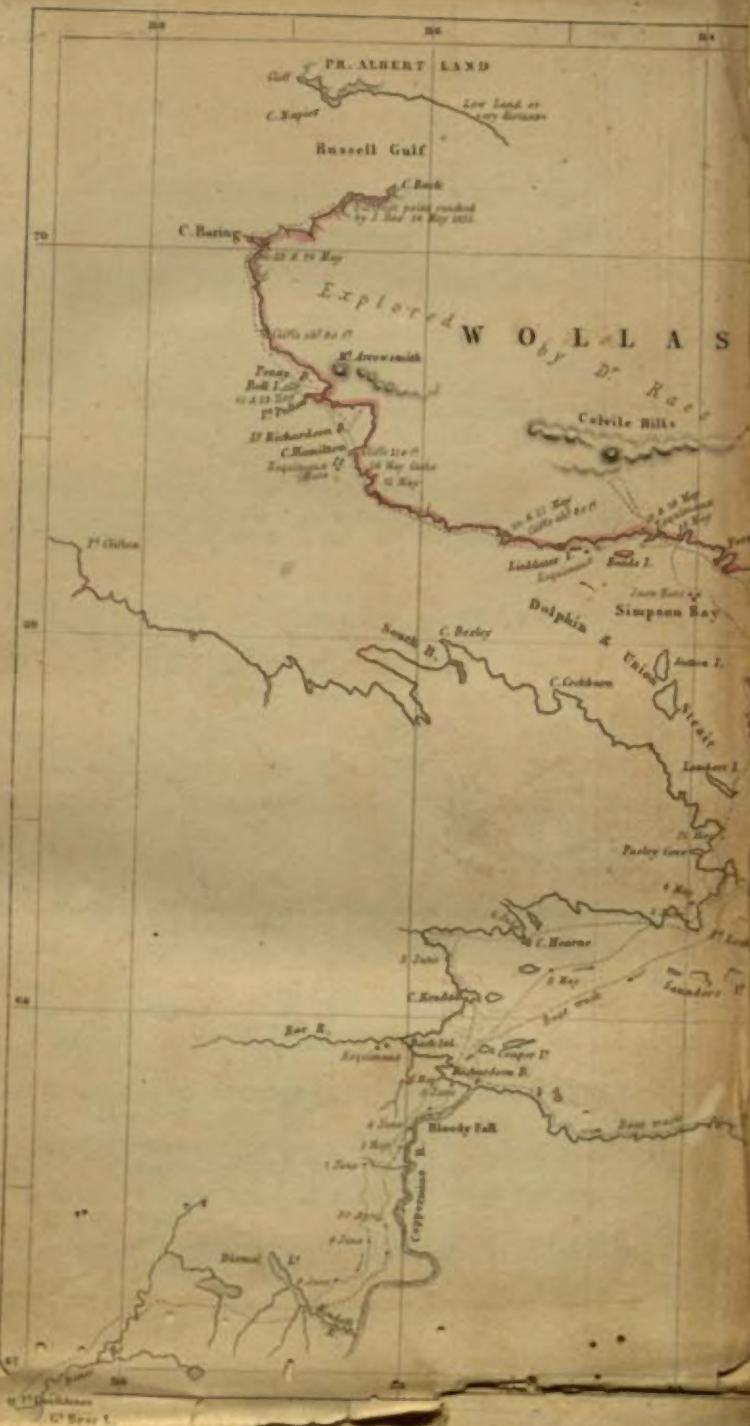
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"	The Settlers' Expedition from Perth to the Gascoigne River, and of
"	The Expedition to the Murchison River.
"	Arctic Coasts examined by Dr. J. Rae.
"	The Journey from Tripoli to Ghadamis by Vice-Consul Dickson.
"	Mr. Gassiot's Route to the Limpopo; also of
"	Mr. Galton's Expedition into the Interior of S.W. Africa from Walvisch Bay, and of
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"	The Ancient Town of Melos, by Lt. Leycester, R.N.
"	Mr. Kennedy's Expedition to the Bareo and Warrego.

ERRATA, &c., IN VOL. XXI.

Page 1, *for* latitude *read* longitude.

— 241, *for* Yule *read* Tule.

By the request of Author, *read* at pp. 127, 128—

" From Cachinal I started alone into the desert of Atacama, in the hope of reaching Huanaguero and Peine, where I supposed I should find the deposits of the Atacama Metacrite; but I unfortunately lost my way, and was obliged to give it up. I fortunately found my way back to the spring of Cachinal, and overtook my late companions near the Aguada de Abajo. On the coast is a fishing cove, where there is a high isolated rock called the *Pas de Azucar*, with a ship passage between it and the land. By bad tracks I reached *Aguia Hedionda*, where the water is rendered fetid by containing sulphur. Crossing the valley of Chafaral I came to the rocky point of *Los Infieles*, where there is a little pasture and water. At *Las Animas*, half a day's journey inland, are the rich copper mines of the same name. At *Port Flamenco*, 10 leagues E., are many rich silver and copper mines. Passing *Salinas*, *Obispo*, and *Tortoralillo* I came to the excellent port of *La Caldera*. I now pursued my journey across the pampa to the valley of *Copiapó*. For a long period this district has been famed for its gold, silver, and copper mines, and already operations have commenced in the formation of a railroad from the town of *Copiapó* to the sea. Journeying onward to *Huasco* I reached the city of *La Serena* or *Copquibó*."

Royal Geographical Society.

1852.

REPORT OF THE COUNCIL,

READ AT THE ANNIVERSARY MEETING, 24TH MAY.

THE Council have again to congratulate the Society upon its satisfactory condition, as exhibited not only in the healthy state of the finances, but also by the progressive increase of its members, the number of which elected since the last anniversary is 50, whilst the vacancies amount only to 20, of which 16 are from death.

Honorary and Corresponding Members.—Upon the proposition of the Council three honorary and three corresponding members have been elected during the past year, viz.:—His Imperial Highness the Grand Duke Constantine, President of the Imperial Geographical Society of St. Petersburg; Lieut.-General de Skribaneck, Chief of the Imperial Geographical Institute of Vienna; and Henry Grinnell, Esq., President of the Geographical Society of New York,—as *Honorary* members; and Don Pascual Madoz, author of the '*Diccionario Geografico-Estadistico-Historico de España y sus Posesiones de Ultramar*'; Professor Hermann Abich, known for his explorations in the Caucasus; and Prince Emmanuel Galitzin, author of a geographical work on Finland, and member of the Geographical Societies of St. Peters-

burg and Paris,—as *Corresponding* members." The Council at the same time mention with regret the death of the Baron C. A. de Walckenaer, member of the Institute of France; of the Rev. Padre Inghirami, of Florence, so long active Honorary members of the Society; and of the Rev. Ch. Gützlaff, the learned Chinese scholar, and one of its Corresponding members.

Finances.—The funded capital of the Society, consisting of 222*l.* 1*s.* 10*d.* in the public stocks, remains unaltered since last year.

On reference to the accounts laid before the Society at the last anniversary, it will be seen that the estimated income for the current year was 1102*l.* 16*s.* 9*d.* It has actually realised 1227*l.* 5*s.*, or 124*l.* 8*s.* 2*d.* more than was calculated upon. Including the balance in hand on the 1st of January last, the disposable income of the Society for this year is estimated at 1342*l.* 13*s.* 10*d.*

A summary of the receipts and expenditure of the Society for the years 1849, 1850, and 1851, is annexed to the yearly accounts herewith, in continuation of the tabular statements in vols. xvi. and xix., which exhibit the financial state of the Society's affairs from its commencement in 1830 to the 31st of December, 1851.

It is but due to your Secretary, Dr. Norton Shaw, to state, that the satisfactory results exhibited during the last years are in a great measure due to his zeal and good management: fully satisfied of which, the Council have thought fit to raise his salary to 200*l.* from that of 150*l.* per annum, which, in the low state of the Society's funds when he undertook the office of Secretary and Editor of your Journal, was all they were then able to propose to him. This increase they doubt not you will sanction, considering how materially the annual income of the Society, as well as the appearance of the Journal, during the last three years, has been improved.

Arrears.—To Dr. Shaw's exertions also must very mainly be ascribed the recovery of so large a portion (upwards of 250*l.*) of the arrears due to the Society when he became your Secretary. After a careful examination of those still outstanding, and repeated efforts in vain to recover them, your Council have determined to close the account by striking off the list of the Society the name of every defaulter owing more than three years' subscriptions.

*The Library Fund of 224*l.* 15*s.**, originally subscribed by individual members of the Society, for the specific use of the library, being now exhausted, the Council have appropriated the sum of 100*l.* out of the increased income for the present year to be expended upon the same.

Publications.—Since the last anniversary, the 21st volume of the Society's Journal has been published.

The Catalogue of the Library (already announced as in preparation) has been likewise published, and is another exemplification of the industry of your Secretary. For the extra labour bestowed upon its compilation the Council had awarded the sum of 50*l.* to him, when Mr. Greenough (who has taken great personal interest and trouble in the matter), with much liberality proposed to take upon himself the expense, by making a donation for the same purpose of a corresponding amount to the Society. The Catalogue will in consequence be delivered *free of expense* to the Fellows.

The following Public Institutions and Libraries have during the last year been added to the list of those to whom the publications of the Society are presented:—The Library of the Foreign Office, the Free Library of Manchester, the University Library of Christiania, the Society of Natural History of Geneva, the Academy of Sciences of Vienna, the Academy of Sciences of Madrid, the Lombardo-Veneto Institute at Milan, the Imperial Geogra-

phical Society of St Petersburg, the University Library of Tübingen, the Congress Library of Washington, and the Library of the Royal Society of Van Diemen's Land.

Accessions to Library.—Additions have been made to the Library since the last anniversary of 593 volumes of Books and Pamphlets, and 732 sheets of Maps and Charts, a list of which is laid on the table, and will as usual be printed in the Journal. The munificent present from the Imperial Geographical Institute of Austria, mentioned at the last anniversary, has been since received, as has been also the valuable bequest of Instruments from our late Fellow, Mr. Robert Shedden. Among the other accessions during the past year the following may be more especially mentioned:—The Great Geographical Dictionary of Spain, in 16 vols. 4to., by Madoz; Carta Geometrica de Galicia, in 10 sheets, by Don Ramon de la Sagra; Berghaus' Physical Atlas, in 2 vols. folio, 2nd edition; Schoolcraft's Indian Tribes of the United States, folio; The Contributions to Knowledge by the Smithsonian Institution of Washington; The Maps and Charts published by the United States Government; The Imperial Statistical Atlas of Russia, in 15 sheets; The additional 35 sheets of the Survey of the kingdom of Wirtemberg; The Charts published by the Dépôt de la Marine of France; The Transactions of the Society of Northern Antiquaries of Copenhagen, and of other foreign bodies; The Topographical Maps of the Canton of St. Gallen, by Mr. Ziegler; and The Charts published by the Hydrographic Office of the Admiralty.

Royal Premium.—The Council have this year awarded the Founder's Medal to Dr. John Rae, in the employ of the Hudson's Bay Company, for his Survey of Boothia under most severe privations in 1848, and for his recent explorations on foot and in

boats of the Coasts of Wollaston and Victoria Lands, by which very important additions have been made to the Geography of the Arctic Regions.

The Patron's Medal has been conferred upon Captain Henry Strachey, of the Honourable East India Company's Service, for his extensive Explorations and Surveys in Western Tibet, as laid down in Maps, which have been submitted to the Council.

BALANCE-SHEET FOR THE YEAR 1851.

	£.	s.	d.
Subscriptions of 192 Members	384	0	0
Composition of 10 Members	245	0	0
Entrance of 40 Members	120	0	0
Arrears of Subscriptions paid up	52	4	0
Dividends on 2000 <i>l.</i> of 3 <i>½</i> per Cent.	63	2	2
	6	10	6
Royal Premium	52	10	0
Journals and Indices sold	105	11	0
Horne Mission, Rent, and Fuel	23	11	0
Sundries overpaid	4	3	0

Total Income in the year 1431

Balance at Banker's, January 1, 1831	£137 12 1	1,036 11 8
" in the Secretary's hands	13 2 0½	
	<hr/>	
	170 14 1½	
	<hr/>	
	£1,227 3 9½	

Examined and found correct.

GEO. O'GORMAN,
F. OSBORNE SMITH,
Auditors.

ROBERT BIDDULPH, Treasurer.

Expenditure.

	£.	s.	d.
House Rent and Fixtures	150	0	0
Salaries—Secretary and Editor	53	0	0
“ Clerk	21	0	0
“ Collector	40	0	0
Wages—Messenger and Housemaid	118	4	3
Journal—Printing Vol. XX., Part II.	55	15	0
“ Illustrations	30	4	3
“ “	25	6	7½
Office Expenses:—	15	2	0
Firing and Lights	17	12	7
Stationery	6	2	7
Freight, Duty, Carriage of Parcels, Postage, &c.	19	3	6
Evening Meetings			
“ “ at Somerset House	83	7	3½
Royal Premium	52	10	0
Miscellaneous Printing	8	15	6
Insurance from fire on 1000 <i>l.</i> , and Advertisements	6	4	6
Books and Binding	3	1	1
Sundry Petty Charges	9	10	9
Amounts overpaid and returned	5	5	0
<i>Total Expenditure in 1851</i>	505	14	7½
Balance at Banker's, Dec. 31, 1851	287	16	0
“ in the Secretary's hands	32	15	2
	320	11	2
	£1,227	5	9½

ROBERT BIDDLE, Teacher.

Dr. BALANCE-SHEET FOR THE LIBRARY FUND, 1851. *Cr.*

	£.	s.	d.		£.	s.	d.
Balance from 1850	.	.	.	Binding Books	12	10	11
Subscription	.	.	.	Map Mounting	.	.	.
	.	.	.	Balance carried to 1852	14	16	5
	.	.	.		3	17	3
	£31	4	7		431	4	7

Examined and found correct. *Auditors.*
 GEO. O'GORMAN,
 E. OSBORNE SMITH.

ROBERT BIDDLEPH, Treasurer.

Receipts.

ESTIMATE FOR THE YEAR 1852.

	£.	s.	d.		£.	s.	d.
Balance at Banker's, January 1, 1852	257	15	0	Journal, including Illustrations	300	0	0
" of Petty Cash in Secretary's hands	32	13	2	Catalogue	100	0	0
Subscriptions of 245 Fellows at 3 <i>l.</i>	320	11	0				
Compositions of 8 Fellows at 25 <i>l.</i>	450	0	0	Rest and Fixtures	400	0	0
Entrance of 40 Fellows at 3 <i>l.</i>	200	0	0	Salaries and Wages	263	13	0
Arrears, estimated to be paid	120	0	0	Purchase of Books, Maps, &c.	310	0	0
Sale of Journals and Indices	30	0	0	Office Expenses	100	0	0
Gifts made on 22nd of Stock	100	0	0	Royal Premium	80	0	0
Royal Premium	63	12	8	Furniture and Repairs	52	10	0
	52	10	0	Miscellaneous Printing	50	0	0
				Luncheon and Advertisements	20	0	0
				Sundries	20	0	0
	£1,342	13	10		40	10	10
					£1,342	13	10

NORTON SHAW, Sec.

Tabular View of Receipts and Expenditure.

A SUMMARY OF THE RECEIPTS AND EXPENDITURE OF THE ROYAL GEOGRAPHICAL SOCIETY, FROM THE 14TH JULY, 1830, TO THE 31st DECEMBER, 1851, INCLUSIVE. (Continued from the Table in Vol. XIX.)

RECEIPTS.	FROM		1849.		1850.		1851.		TOTALS from	
	July 14, 1830,		TO		TO		TO		July 14, 1830,	
	£.	s. d.	£.	s. d.	£.	s. d.	£.	s. d.	£.	s. d.
Entrance Fees	3,040	0 0	39	0 0	72	0 0	120	0 0	3,321	0 0
Commissions	7,028	0 0	23	0 0	171	0 0	245	0 0	7,469	0 0
Annual Contributions	8,640	19 0	380	0 0	410	0 0	381	0 0	9,814	19 0
Arrears recovered	878	16 0	80	0 0	120	0 0	52	4 0	1,131	0 0
Dividends on Stock	2,309	1 8	69	12 8	69	12 8	69	12 8	2,517	19 8
Sale of Stock	2,739	3 4	..	..	..	..	..	..	2,739	3 4
Journals and Indices sold	1,768	17 11	88	12 6	86	14 9	105	11 0	2,049	16 2
Advertisements in the Journal	12	9 0	..	..	21	11 0	..	..	31	0 0
Royal Premiums	945	0 0	52	10 0	53	10 0	52	10 0	1,102	10 0
Sundries and overpaid	18	14 0	12	0 10	2	1 0	4	3 0	37	4 10
Borocco Mission Rent	70	1 0	31	1 0	31	1 0	23	11 0	161	14 0
Copyright of a Map sold	100	0 0	..	..	..	..	..	..	100	0 0
From the Palestine Association	515	9 8	..	..	..	..	..	..	515	9 8
In aid of Expeditions	2,280	0 0	..	..	..	..	..	..	2,280	0 0
From the Horticultural Society	10	0 0	..	..	..	..	..	..	10	0 0
Various Donations	267	5 0	..	..	..	..	..	..	267	5 0
INCOME	30,679	16 7	778	3 0	1,036	10 5	1,056	11 8	33,551	1 8
Add the CASH BALANCE from preceeding year	..	..	331	11 0½	11	6 6	170	14 1½	..	..
Shows the TOTAL RECEIPTS, as per Balance Sheet in each year	..	..	1,109	11 0½	1,047	16 11	1,227	5 9½	..	..

* 246l. 4s. 4d. proceeding from the sale of 278l. 4s. 4d. in 1848.—Ed.

Library Regulations.

I. The Library shall be open every day in the week (Sundays excepted) from *Eleven* in the morning to *Five* in the afternoon, except on New Year's Day, Good Friday to Easter Monday inclusive, and Christmas week; and it shall be closed one month in the year, in order to be thoroughly cleaned, viz. from the first to the last day of September.

II. Every Member of the Society shall be entitled (subject to the Rules) to borrow as many as four volumes at one time.

Exceptions:

1. Dictionaries, Encyclopedias, and other works of reference and cost, Minute Books, Manuscripts, Atlases, Books and Illustrations in loose sheets, Drawings, Prints and unbound Numbers of Periodical Works, *unless with the special written sanction of the President.*
2. Maps or Charts, *unless by written order of the President, Council, or Secretaries.*
3. New Works before the expiration of a month after reception.

III. The title of every Book, Pamphlet, Map, or Work of any kind lent, shall first be entered in the register, with the borrower's signature, or accompanied by a separate note in his hand.

IV. No work of any kind shall be retained longer than one month; but at the expiration of that period, or sooner, the same shall be returned free of expense, and may then, upon *re-entry*, be again borrowed, provided that no application shall have been made in the mean time by any other Member.

V. In all cases a list of the Books, &c., or other property of the Society, in the possession of any member, shall be sent in to the Secretary *on or before the 1st of July in each year.*

VI. In every case of loss or damage to any volume, or other property of the Society, the borrower shall make good the same.

VII. No stranger shall be admitted to the Library except by the introduction of a Member, whose name, together with that of the Visitor, shall be inserted in a book kept for that purpose.

VIII. Members transgressing any of the above Regulations shall be reported by the Secretary to the Council, who will take such steps as the case may require.

By Order of the Council,

NORTON SRAW, Sec.

December 9, 1850.

ROYAL GEOGRAPHICAL SOCIETY.

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THE QUEEN.

Vice-Patron.
H. R. H. PRINCE ALBERT.

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(35)

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(37)

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N.B.—Those having an asterisk preceding their names have compounded.

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HYDROGRAPHIC OFFICE.

Marquesas Islands. Plan de l'île Tahuaia. Paris, 1851. DÉPÔT DE LA MARINE.

New Holland and New Guinea, Maps and Charts relating to, by Dalrymple and others. 19 sheets. JAMES WYLD, Esq., F.R.G.S.

NEW ZEALAND.—Wangati Harbour. 1849.

Papua, or New Guinea. Sheets 4 to 8, incl. 1850. HYDROGRAPHIC OFFICE.

Plan de la Côte Occidentale de Tahiti, de Papeete à Poomavia. Paris, 1851.

DÉPÔT DE LA MARINE.

VAN DIEMEN'S LAND.—Derwent River. 1849.

——— Entrecasteaux Channel. 1849. HYDROGRAPHIC OFFICE.

ARCTIC.

Arctic Sea, Discoveries in the. 1851. HYDROGRAPHIC OFFICE.

ARCTIC AMERICA, Chart of.—Discoveries of the Searching Expeditions under Captains Austin and Penny. 1851. HYDROGRAPHIC OFFICE.

ATLANTIC.

Atlantic Ocean, Chart of the. 1850.

——— Eastern part. 1850.

——— Western part. 1850. 3 Sheets.

HYDROGRAPHIC OFFICE.

INDIAN OCEAN.

Carte des Détroits de Banca et de Garpar. Paris, 1850. DÉPÔT DE LA MARINE.

MACASSAR.—Kaart van het Vanwater Bemoorden Makassar. By Lieut. J. van Gogh.
1849. 2 sheets. Amsterdam, 1851. Chev. JACOB SWART, Cor. F.R.G.S.INDIAN ARCHIPELAGO, Maps and Charts relating to the. By Dalrymple and others.
57 sheets. JAMES WYLD, Esq., F.R.G.S.——— JAVA.—Carte du Passage de Carimata. Paris, 1850.
DÉPÔT DE LA MARINE.

——— Islands East of. 1848. HYDROGRAPHIC OFFICE.

——— Kaart van het Eiland Java te zamengesteld uit officiële
bronnen door C. W. M. Van de Velde. 2 sheets. Leiden, 1845. The Author.

Maps, Charts, &c.

Donors.

- INDIAN ARCHIPELAGO.—MALACCA.—Maps and Charts relating to Ava and Malacca. By Dalrymple and others. 29 sheets. JAMES WYLD, Esq., F.R.G.S.
- PHILIPPINES, Maps and Charts relating to the, &c. By Dalrymple, Horsburgh, and others. 29 sheets. JAMES WYLD, Esq., F.R.G.S.
- SUMATRA, JAVA, and BORNEO, Maps and Charts relating to. By Dalrymple and others. 53 sheets. JAMES WYLD, Esq., F.R.G.S.
- Mouillage de Beouma. Paris, 1851.
- Meurka. Paris, 1851. DÉPÔT DE LA MARINE.
- Sunda Strait. 1849. HYDROGRAPHIC OFFICE.

MEDITERRANEAN.

- Carte des golfes de Venise et de Trieste. Paris, 1851.
- Carte Générale de la Méditerranée. Paris, 1851. DÉPÔT DE LA MARINE.
- Cyprus Island. 1849.
- GRECIAN ARCHIPELAGO.—Sheet 2, 1830-49; Sheet 3, 1831-41. HYDROGRAPHIC OFFICE.
- Carte des Débarquemens de Syra et des Isles Andros, Tinos, Mykon, Delos, Zée, &c. Paris, 1850. DÉPÔT DE LA MARINE.
- Skopelo Group. 1847.
- ORONTES Road, Poidium Bay, and Road Island. 1850.
- SANTORIN Island, ancient Thera, surveyed by Capt. Thos. Graves, R.N., F.R.G.S.
- SICILY.—Graham Shoal. 1841. HYDROGRAPHIC OFFICE.

MISCELLANEOUS.

- DISTANCE TABLES.—I. Distances between the principal Seaports in the N. and S. Atlantic Oceans and adjacent seas.—II. Distances in the Indian Ocean, Bay of Bengal, Red Sea, Persian Gulf, &c.—III. Courses and Distances between the principal Ports, Headlands, &c., on the Steam lines of Eastern Postal Communication.—IV. Tables of the Distances between the Ports on the present and projected Steam lines of Eastern Postal Communication.—V. Remarks to accompany the General Distance Tables. By Henry Gribble, Commander, R.N., F.R.G.S. In 5 sheets. 1851. THE AUTHOR.
- GENERAL BOARD OF HEALTH.—Specimen Plan for Town Surveys under the Public Health Act. Part of Bermondsey, in the county of Surrey. 2 sheets. THE BOARD.
- GEOGRAPHICAL View of the Great Exhibition of 1851. Compiled and drawn by Augustus Petermann, F.R.G.S. 1851. THE AUTHOR.
- ILLUSTRATIONS of Physical Geography, Meteorology, Terrestrial Magnetism, &c. 8 subjects in 1 sheet. By A. Petermann, F.R.G.S. 1852. THE AUTHOR.
- LORD'S PRAYER in 314 different Dialects. 16 sheets, in portfolio. Folio. Vienna. Councillor ADER, of the Imp. Printing Office, Vienna.
- MULTIPLE Cyclone, March, 1851. By H. Bouquet. G. HAILLE, Esq.
- PORTRAIT of the late Sir John Barrow, Bart., F.R.G.S. In frame. JOHN BARROW, Esq., F.R.S., F.R.G.S.
- SMALL Portfolio, with ruled blank leaves for rough Survey. SIR G. BAUR, R.N., F.R.S., V.P.R.G.S.
- VEN du Grand Ararat, prise de la Cime du Petit Ararat en Août 1844. MORA, DE LA ROQUETTE.
- WHALE Chart, by M. F. Maury, A.M., Lieut. U. S. Navy. New York, 1851. THE HON. E. EVERETT, Cor. F.R.G.S.

Proceedings of the Royal Geographical Society of London.

SESSION 1851-52.

First Ordinary Meeting, November 10, 1851.

The President, Sir RODERICK I. MURCHISON, in the Chair.

His Imperial Highness the Grand Duke Constantine of Russia was elected an Honorary Member, and

Thomas Evans Blackwell, Esq., C.E.; and Col. Harry Jones, R.E., were elected Fellows.

The Papers read were—

1. Proposed Expedition along the Coasts of Siberia in search of Sir J. Franklin, by Lieut. B. C. Pim, R.N.

2. Journey from Great Bear Lake to Wollaston Land, by Dr. John Rae, and

3. Progress of the Mission to Central Africa and Lake Chad, by Dr. Barth.

Second Ordinary Meeting, November 24, 1851.

Sir WOODBINE PARISH, Vice-President, in the Chair.

The Chairman directed attention to the munificent present of maps and charts from Lieut.-General de Skribaneck, of Vienna, to whom a special vote of thanks was unanimously passed.

Lieut.-General de Skribaneck, of Austria, was elected an Honorary, and

Don Pascual Madoz, of Spain, a Corresponding Member, and

Sir Wm. Moleworth, Bart., M.P.; Capt. Wm. Ramsay, R.N.; James Ewing, Esq.; E. J. Harrington, Esq.; Rev. Samuel Clark, M.A.; Wm. Witherforce Bird, Esq.; Lieut. B. C. Pim, R.N.; Dr. B. Bynoe, R.N.; Dr. W. F. Daniel; R. Maxwell Fox, Esq., M.P.; Capt. Richard Strachey, of the Bengal Engineers; and W. B. Beaumont, Esq., M.P., were elected Fellows.

The Paper read was—

Notes on the Geographical Discoveries in the Arctic Regions, made by the late expedition under Capt. Austin, R.N., by Capt. E. Ommanney, R.N., F.R.G.S.

Third Ordinary Meeting, December 8, 1851.

The President, Sir RODERICK I. MURCHISON, in the Chair.

Professor Hermann Abich, of the Caucasus, was elected a Corresponding Member, and

Robert Cust, Esq., of the Hon. East India Company's Civil Service; Lieut. E. M. Leycester, R.N.; and Henry Bois, Esq., were elected Fellows.

The President announced that the 21st volume of the Journal had been published by the Secretary, and would be presented, upon application, free to the Fellows.

The Papers read were—

1. Letter from Capt. Penny on Sir J. Franklin's Expedition.
2. Description of the Friendly Islands, and Visit of H.M.S. Meander, Capt. the Hon. H. Keppel, to Tongatabu, in 1850, by O. W. Brierly, Esq., F.R.G.S.

Fourth Ordinary Meeting, January 12, 1852.

The President, Sir RODERICK I. MURCHISON, in the Chair.

Mr. J. Oliviera de Carvalho; Wm. Devoy; A. Anderdon Weston, M.A.; J. W. Parker, jun.; and Algernon Greville, Esqrs., were elected Fellows.

The Papers read were—

1. Ascent of Orizaba in Mexico, by Ed. Thornton, Esq., F.R.G.S.
2. Communications respecting the Expeditions proposed by Lieut. Pim, R.N., and by Capt. Beatson, in search of Sir J. Franklin.
3. Communication between the Atlantic and the Pacific, *via* British North America, by Capt. M. H. Synge, R.E., F.R.G.S. (*First Part.*)

Fifth Ordinary Meeting, January 26, 1852.

The President, Sir RODERICK I. MURCHISON, in the Chair.

J. Houghton Langston, Esq., M.P.; J. A. Silk, Esq.; E. Owen Tudor, Esq.; Oswald Walters Brierly, Esq.; and the Rev. Rob. M. Inskip, were elected Fellows.

The Paper read was—

Communication between the Atlantic and the Pacific, *via* British North America, by Capt. M. H. Synge, R.E. (*Second Part.*)

Sixth Ordinary Meeting, February 9, 1852.

The President, Sir RODERICK I. MURCHISON, in the Chair.

Nathaniel Beardmore, Esq., C.E.; Capt. M. H. Synge, R.E.; and David Barclay, Esq., were elected Fellows.

The Papers read were—

1. Lieut. Pim's statement on his return from St. Petersburg.
2. Distribution of Arctic Animal Life, by Mr. A. Petermann, F.R.G.S., and
3. Latest Explorations in South Africa, by the Rev. D. Livingston and W. Cotton Oswald, Esq. (*First Part.*)

Seventh Ordinary Meeting, February 23, 1852.

The President, Sir RODERICK I. MURCHISON, in the Chair.

The Hon. Robert Bourke; the Ven. Archdeacon Raymond; Robert Cooke; and James Crowdy, Esqrs., were elected Fellows.

The Papers read were—

1. Meteorological Notices in Egypt, by Hugh Thurburn, Esq., and
2. Expedition into the Interior of South Africa, from Walvisch Bay, by Francis Galton, Esq., F.R.G.S. (*First Part.*)

The President announced that he had directed cards of invitation to his three soirées, on March the 6th and 20th, and April 3rd, to be sent to every Fellow of the Society whose address was known, and expressed his hope to see a full attendance at his house on those occasions.

Eighth Ordinary Meeting, March 8, 1852.

The President, Sir RODERICK I. MURCHISON, in the Chair.

Henry Grinnell, Esq., President of the Geographical Society of New York, was elected an Honorary Member, and Capt. Donald Beatson; Capt. Wm. Peel, R.N.; Joshua Bates; and J. W. Prout, M.A., Esqrs., were elected Fellows.

The Papers read were—

1. Route from Tripoli to Ghadamis, by Vice-Consul Dickson.
2. Narrative of the visit of H.M.S. 'Calypso,' Captain Worth, to the Georgian, Navigators', Feejee, and Friendly Islands.

Ninth Ordinary Meeting, March 22, 1852.

The President, Sir RODERICK I. MURCHISON, in the Chair.

The Earl of Verulam; Commanders William S. Patten, and Washington Carr, R.N., were elected Fellows.

The Papers read were—

1. Statement on the progress of the proposed Behring Strait Expedition in search of Sir J. Franklin, by Capt. Beatson.
2. Notes on the Distribution of Arctic Animal Life, by Mr. P. L. Simmonds, and
3. Travels in South-Western and South-Eastern Africa, by Mr. H. Gassiot.

Tenth Ordinary Meeting, April 5, 1852.

The President, Sir RODERICK I. MURCHISON, in the Chair.

Samuel R. Bloch, Esq., was elected a Fellow.

The papers read were—

1. Account of the recent Exploration of the South and East Coasts of Victoria Land, in the Arctic Regions, in search of Sir John Franklin, by Dr. John Rae, and
2. On the Classification of Watersheds, by the Rev. C. G. Nicolay, F.R.G.S.

Eleventh Ordinary Meeting, April 26, 1852.

The President, Sir RODERICK I. MURCHISON, in the Chair.

Prince Emmanuel Galitzin, of Russia, Author of a Geographical work on Finland, was elected a Corresponding Member, and

Capt. J. C. Dalrymple Hay, R.N.; Capt. R. M. Westmacott; and Courtenay Tagart, Esq., were elected Fellows.

The Papers read were—

1. Expedition into the Interior of South Africa, from Walfisch Bay, by Francis Galton, Esq., F.R.G.S. (*Second Part.*)
2. A proposal to ascend the Niger, and descend the Gambia, by Lieut. Lyons MacLeod, R.N.

Twelfth Ordinary Meeting, May 10, 1852.

The President, Sir RODERICK I. MURCHISON, in the Chair.

Colonel Edward Sabine, R.A., F.R.S.; Lieut. Lyons MacLeod, R.N.; and Henry Edwards, Esq., were elected Fellows.

The Papers read were—

1. Observations taken with the Aneroid in Palestine and Syria, by Capt. Wm. Allen, R.N.
2. Sketch of the Geography of Borneo, by John Crawford, Esq., F.R.S., F.R.G.S., and
3. Account of the Volcanic Group of Milo, by Lieut. E. M. Leicester, R.N., F.R.G.S.

ANNIVERSARY MEETING, 1 P.M., MAY 24, 1852.

The President, Sir RODERICK I. MURCHISON, in the Chair.

The Minutes of the last Meeting having been read and confirmed, Aug. Petermann and Jno. Brown, Esqs., were appointed Scrutineers for the Ballot. The Report of the Council, together with the Balance-sheet for 1851, and the Estimates for 1852, was read and adopted. The President then reported the grounds on which the Council had awarded the Royal Medals, "for the Encouragement of Geographical Science and Discovery," to Dr. John Rae, of the Hudson's Bay Company, and Capt. Henry Strachey, of the Honourable East India Company's service (see p. lvii). The Anniversary Address was next read, when a vote of thanks was unanimously passed, with a request that the President do allow the Address to be printed.

At the conclusion of the Ballot the Scrutineers reported to the President that the changes recommended by the Council had been adopted, and that the following had been duly elected:—

President.—Sir RODERICK IMPEY MURCHISON, G.C.St.S., F.R.S., &c., Corr. Inst. Fr.

Vice-Presidents.—Sir GEORGE BACK, R.N., F.R.S.; Sir WOODBINE PARISH, K.C.H., F.R.S.; Capt. W. H. SMYTH, R.N., K.S.F.; Right Hon. the Earl of ELLESMERE, F.S.A.

Treasurer and ex-officio Trustee.—ROBERT BIDDULPH, Esq.

Trustees.—Sir GEO. T. STAUNTON, Bart., F.R.S.; W. R. HAMILTON, Esq., F.R.S.

Honorary Secretaries.—Colonel PHILIP YORKE, F.R.S., &c.; THOMAS HODGKIN, Esq., M.D., &c.

Council.—JOHN ARROWSMITH, Esq., F.R.A.S.; Admiral Sir FRANCIS BEAUFORT, K.C.B.; Right Hon. Lord COLCHESTER, R.N.; RALPH W. GREY, Esq., M.P.; Colonel SABINE, R.A., F.R.S.; Sir CHARLES FELLOWS, V.P.R.I.; Capt. ROBERT FITZROY, R.N., F.R.S.; GEO. BELLAS GREENOUGH, Esq., F.R.S.; W. J. HAMILTON, Esq., F.G.S.; JOHN HUGG, Esq., M.A., F.R.S.; Right Rev. the BISHOP of ST. ASAPH; Right Hon. the Earl of SHEFFIELD; E. OSBORNE SMITH, Esq., F.S.A.; Lieut.-Col. W. H. SYKES, F.R.S.; JAMES MURRAY, Esq. (Foreign Office); Duke of NORTHUMBERLAND, R.N., F.R.S.; GEORGE O'GORMAN, Esq., F.G.S.; Sir J. GARDNER WILKINSON, F.R.S.; HENRY RAFFER, Esq., R.N., F.R.A.S.; Rev. G. C. RENOUARD, B.D., F.R.A.S.; Sir WALTER C. TREVELYAN, Bart., M.A.

The thanks of the Meeting were next separately voted to the President, Vice-Presidents, Secretaries, and Members of the Council, as well as the Auditors and Scrutineers.

The President finally directed the attention of the Society to the usual Anniversary Dinner, and the Meeting adjourned at 4 p.m.

Thirteenth Ordinary Meeting, June 14, 1852.

H.R.H. Prince ALBERT, the Vice-Patron, present.

The President, Sir RODERICK I. MURCHISON, in the Chair.

Professor Christoforo Negri, Chief of the Consular Department of the Foreign Office of Turin, was elected a Corresponding Member; and Joseph Locke, Esq., M.P.; John Chevalier Cobbold, Esq., M.P.; Isambard Kingdom Brunel, Esq., F.R.S.; Lieut.-Col. Wm. J. D'Urban; James French, Esq., M.D.; Commander James Banks West, R.N.; Lieut. Wm. Charles Buncroft, 16th Regt., Jamaica; Daniel Clarke, A. de Boivinville, and Geo. Frederick Harris, Esqs., were elected Fellows.

The Papers read were—

1. Surveys in Western Tibet (for which the Victoria Medal was this year awarded to Capt. Henry Strachey), by Capt. R. Strachey.
2. Latest Explorations in South Africa by Messrs. Livingston and William Cotton Oswell (*Second Part*), with Observations by the President on the new Geological Map of the Cape Colony by Mr. Bain.
3. Proposal to excavate the ancient Harbour of Seleucia, with a view to a Communication with the East, *via* the Euphrates, by Capt. William Allen, R.N., F.R.S., F.R.G.S., and
4. On the Climate of Zanzibar, with Observations on the progress of discovery in Eastern Africa, by Colonel W. H. Sykes, F.R.S., F.R.G.S.

The thanks of the Society were then unanimously voted to the President and authorities of the Royal Institution, for their kindness in granting the use of the Theatre of that Institution for the Evening Meetings of the Society during the past Session.

MISCELLANEOUS.

Twenty-second Meeting of the British Association for the Advancement of Science, held at Belfast, September 1 to 9, 1852. (Section E, Geography and Ethnology.)

President.—Colonel CHESNEY, R.A., D.C.L., F.R.S., F.R.G.S., &c.

Vice-Presidents.—Sir RODERICK I. MURCHISON, Pres. R.G.S.; Major LARCOM, R.E.; and the Rev. Dr. E. HINCKS.

Secretaries.—Dr. NORTON SHAW, Sec. R.G.S.; R. CULL, Esq., Sec. Ethn. Soc.; and ROBERT MACADAM, Esq., of Belfast.

Committee.—His Grace the ARCHBISHOP of DUBLIN; Capt. WILLIAM ALLEN, R.N., F.R.G.S.; Rev. W. BRUCE; Dr. A. HUME; F. HINDMARSH, Esq., F.R.G.S.; Sir H. MARSH; J. GRATTAN, Esq.; Professor MACDOUALL; Dr. MOORE; Sir J. ROSS; Mr. PIERRE TCHIHATCHEF; Col. SYKES, F.R.S., F.R.G.S.; Lieut. L. MACLEOD, R.N., F.R.G.S.; J. G. PRICE, Esq.; WESTWORTH DILKE, Esq., F.R.G.S.; Col. SABISE, F.R.S., F.R.G.S.; Dr. LEE, of Hartwell, F.R.S., F.R.G.S.; Dr. M'GEE, R.N.; Dr. STANGER; J. E. WINTERTHROP, Esq., F.R.G.S.

The Papers read were—

1. Proposal for the Excavation of the ancient Port of Seleucia, in connection with the route by the Euphrates to India, by Capt. William Allen, R.N.

2. On the Ethnological Bearing of the recent Discoveries, in connection with the Assyrian Inscriptions, by the Rev. Edward Hincks.

3. On the Geographical Distribution of Common Salt, by W. Bolleert, Esq., F.R.G.S.

4. Description of a Samocid Family, by J. W. Giles, Esq.

5. Notes on the Aurora Borealis, by Sir J. Ross.

6. Proposal for a Railroad through Asia Minor, by W. F. Ainsworth, Esq., F.R.G.S.

7. Climatological Notes on Pisa and Lucca, by Dr. J. Gason.

8. Proposed Expedition to ascend the Niger, by Lieut. L. MacLeod, R.N., F.R.G.S.

9. On the possessions of the Imam of Muscat, and on the Climate of Zanzibar, with Observations on the Prospects of African discovery, by Colonel Sykes.

10. Comparative merits of the proposed Routes to India, by Colonel Chesney.

11. On the Connection between the Indian, European, Semitic, and Egyptian forms of the Personal Pronouns, by the Rev. Dr. Hincks.

12. On the Present State of Medo-Persic Philology, by Professor MacDouall.

13. Recent Journey through Africa from Zanzibar to Angola, communicated by the Royal Geographical Society.

14. Latest Explorations in South Africa, by the Rev. D. Livingston and W. Cotton Oswald, Esq.

15. Expedition to the Eastward of Walfisch Bay, by Francis Galton, Esq., F.R.G.S.

16. Attempt to account for the numerous marks of sudden and violent drainage in the Valley of the Dead Sea, with a proposition for a Ship Canal to India, by Capt. W. Allen, R.N., F.R.G.S.

17. Proposed Communication with the East, *via* British North America, by Capt. M. H. Synge, R.E., F.R.G.S.

18. Some Account of the Origin, Characteristics, and Dialect of the People of Counties Down and Antrim, by the Rev. Dr. Hume.

19. Recent Survey for a Ship Canal through Central America, communicated by the Royal Geographical Society.

20. On the Misapplication of the terms Development and Evolution to the Formation of the Inflections of a Language, with

21. Note on Blumenbach's 'Classification of the Human Race,' by Richard Cull, Esq.

22. Report of the Proceedings in Central Australia in search of Dr. Leichhardt's Missing Expedition, communicated by the Royal Geographical Society.

23. Remarks on a Collection to illustrate the Ethnology of Java, communicated by Dr. Hodgkin.

24. Letter on the Commerce of the Upper Nile, from Vice-Consul Vaudey, translated and communicated by Dr. Shaw.

25. The Ice-masses of Greenland and the Icebergs of the Arctic Seas, by Mr. Rink, of Copenhagen, communicated by the Royal Geographical Society.

Among the Reports made by the Committee of Recommendations to the General Committee, were—

"That the sum of 5*l*. be granted for defraying the expenses attending the distribution of the Manual of Ethnological Inquiry prepared by a Sub-committee appointed in 1851.

That a large Outline Map of the World be provided for the use of Section E, and that Sir R. I. Murchison, the Lord Bishop of St. Asaph, Dr. Shaw, and R. Cull, Esq., the Secretaries of the Geographical and Ethnological Societies, be a Committee for carrying this into effect, with 15*l*. at their disposal for the purpose.

That in order to meet the growing wants of science, and remedy, in some degree, the inconvenience caused to its cultivators by the dissociated, incomplete, and discontinuous publication of scientific researches, it is expedient that the British Association, which, by its constitution, includes representatives of the various scientific institutions of the empire, should propose such general views on the subject as may be suggested by the experience of its members.

That a Committee be formed for the purpose of considering a plan by which the Transactions of different scientific societies may become part of one arranged system, and the records of facts and phenomena be rendered more complete, more continuous, and more convenient than at present.

That it be an instruction to this Committee to place itself in communication with the Council of the Royal Society, and the Councils of other scientific societies which receive scientific communications at regular meetings.

That the Committee consist of Professor W. Thomson, Professor Andrews, Leonard Horner, Esq., Professor Owen, Sir R. I. Murchison, Colonel Sykes, W. J. Rankine, J. C. Adams, Esq., Dr. Lloyd, Professor Wilson (Balist), Dr. Robinson, Professor Bell, Professor Graham, W. R. Grove, Esq., Sir D.

Brewster, and *ex officio* the General Officers, with power to add to their number.

That it is important to have a quarterly record of British and foreign publications and discoveries, and that the consideration of the practicability of obtaining this be referred to the same Committee.

That the publication of the reduction upon a scale of one inch to the mile of the Townland Survey of Ireland, ordered to be made in connection with the Geological Survey by the Ordnance, and for which a vote was taken for 1852-53, upon the estimates of that department, be recommended to the Government to be accelerated.

That with the view of obtaining an accurate knowledge of the countries on and near the eastern coast of Africa, from the Red Sea to 10° S. lat., the very important products of which have been enumerated by the late Sir Charles Malcolm and Mr. W. D. Cooley, the British Association do call the attention of the Court of Directors of the Honourable the East India Company to the desirableness of sending an expedition thoroughly to explore that region, as recommended by the Royal Geographical Society of London. The deputation to consist of the President of the British Association and the President and Vice-Presidents of the Royal Geographical Society.

That the Government be requested on the part of the British Association to connect with the survey of the Gulf Stream an examination of the zoology and botany of this current, and also of the temperature of the seas around the shores of the British Islands.

The Committee having been informed that an expedition has been proposed for ascending the Niger to its source, by Lieut. Lyons MacLeod, R.N., and that it has been recommended to her Majesty's Government by the Royal Geographical Society and the Chamber of Commerce of Manchester, resolve that the President be requested to confer with the President of the Royal Geographical Society in bringing the subject before the Government.

The Committee having understood that Dr. Bakie, Mr. A. Adams, and Mr. W. T. Alexander, each of them in the medical branch of her Majesty's Navy, have offered to undertake a thorough exploration of the countries watered by the river Magdalena, in South America, in respect to their botanical, zoological, and geological products, on condition of being allowed their full pay, requests the President of the Association and Sir R. I. Murchison to urge the Government to accede to the proposition.

That the systematic collection of the agricultural statistics of Great Britain of a similar nature with the Returns of the Agricultural Produce of Ireland, prepared under the care of Major Larcom, R.E., is a desideratum, and would be of great public utility: and that the President, Mr. Heywood, Major Larcom, and Colonel Sykes be requested to communicate the above resolution to the Government.

The Committee being aware of the liberality with which the Master-General and Board of Ordnance have supplied the several engineer stations with instruments for meteorological observations, would suggest the advantage of adding to their instruments, in the Ionian Islands, others for measuring the direction and amount of earthquake vibrations, so frequent in those islands."

The next meeting of the British Association will be held at Hull.

PRESENTATION

OF THE

GOLD MEDALS

AWARDED TO DR. JOHN RAE, OF THE HUDSON'S BAY COMPANY, AND CAPTAIN HENRY STRACHEY, OF THE HONOURABLE EAST INDIA COMPANY'S ENGINEERS.

THE Founder's Gold Medal has been awarded by the Council to Dr. John Rae "for his survey of Boothia under most severe privations in 1848, and for his recent explorations on foot, and in boats, of the coasts of Wollaston and Victoria Lands, by which very important additions have been made to the geography of the Arctic regions."

Dr. Rae's survey of the inlet of Boothia in 1848 was unique in its kind. With a boldness never surpassed, he determined on wintering on the proverbially desolate shores of Repulse Bay, where, or in the immediate neighbourhood, one expedition of two ships had previously wholly perished, and two others were all but lost. There he maintained his party on deer shot principally by himself, and spent ten months of an Arctic winter in a hut of stones, the locality not even yielding drift timber. With no other fuel than a kind of hay made of the *Andromeda tetragona*, he preserved his men in health, and thus enabled them to execute their arduous surveying journeys of upwards of 1000 miles round Committee Bay (the southern portion of Boothia Gulf) in the spring. Next season he brought his party back to the Hudson Bay posts in better working condition than when he set out, and with but a small diminution of the few bags of provisions he had taken with him.

In his last journeys, in which he travelled more than 3000 miles in snow-shoes, Dr. Rae has shown equal judgment and perseverance. Dreading, from his former experience, that the sea might be frozen, he determined on a spring journey over the ice, and performed a most extraordinary one. His last starting-place at Fort Confidence, on the Great Bear Lake, being at the distance of more than 150 miles from the coast by the route he was compelled to take, he could not, as in the parties of our naval expeditions, travel on the ice with capacious sledges, and was therefore obliged to restrict his provisions and baggage to the smallest possible weight. With a pound of fat daily for fuel, and without the possibility of carrying a tent, he set out accompanied by two men only, and, trusting solely for shelter to snow-houses, which

he taught his men to build, accomplished a distance of 1060 miles in 39 days, or 27 miles per day including stoppages—a feat which has never been equalled in Arctic travelling; and this without the aid of advanced depôts, and dragging a sledge himself great part of the way.

The spring journey, and that which followed in the summer in boats, during which 1700 miles were traversed in 80 days, have proved the continuity of Wollaston and Victoria Lands along a distance of nearly 1100 miles, and have shown that they are separated by a strait from N. Somerset and Boothia, through which the flood-tide sets from the north. In this way Dr. Rae has performed most essential service, even in reference to the search after Franklin, by limiting the channels of outlet between the continent of America and the Arctic Islands, as now laid down in a new map by Mr. Arrowsmith.

The President, having read the above notice, then addressed Sir George Back in these words:—

“Sir George, I rejoice that Arctic explorers of such high reputation as yourself and Sir John Richardson, and so sound a geographer as Mr. Arrowsmith, should have successfully urged the merits of Dr. Rae, and have satisfactorily established his claims to our highest reward. To you, with whom I have lived on terms of friendship since the period of Franklin's first expedition, I have peculiar satisfaction in handing this medal, and in requesting you to convey it to the bold and judicious traveller* who has won it, with the assurance of the deep sense I entertain of the value of his services.”

Sir George Back replied—

“In the absence of Dr. Rae, I cannot but feel great pleasure in being made the recipient of this proof of the value set on his services by the Royal Geographical Society.

“We, in fact, but honour ourselves in thus distinguishing with the high token of our esteem and admiration the honest and unassuming traveller who, in his severest trials, evinced a judgment always equal to the occasion.

“Sir, in my opinion, every word of his narrative is stamped with truth. If time permitted, I could relate more than one anecdote showing the hardy indifference with which he regarded what, among *voyageurs*, are termed personal comforts. In his last Boat Expedition he had not even the Arctic luxury of a cup of tea, but was well content to share the chance luck of the kettle with his crew.

“His greatest suffering, he once remarked (little thinking it would be repeated), arose from being obliged to sleep upon his frozen moccasins in order to thaw them for the morning's use.

“He will appreciate and honour this Medal, as well as the courteous manner in which you, Sir, have bestowed it: nor will Sir J. Pelly and the Hudson's Bay Company be less gratified at the distinction. In Dr. Rae's name I beg to return you infinite thanks.”

The Victoria or Patron's Gold Medal is awarded to Captain Henry Strachey, of the Hon. East India Company's service, “For his extensive

* Dr. Rae was absent on a visit to his family at Stromness in Orkney.

explorations and surveys in Western Tibet, as laid down in maps which have been submitted to the Council, and are now laid before the Society."

Captain Henry Strachey's first expedition into Tibet was made, in the summer of the year 1846, over the passes of Western Kumaon. He then penetrated to within a few miles of the river Sutlej, returning by a more easterly route. On this occasion, besides obtaining some acquaintance with those mountain-passes, with which he has since become so familiar, and the elevation of which ranges from 17,000 to 19,000 feet or more, he was enabled for the first time clearly to point out the remarkable circumstance that the water-shed of the chief rivers of this portion of the Himalaya is to the N. of the line of greatest elevation—a phenomenon which seems to hold good in all parts of the chain.

In the autumn of the same year he again entered Tibet, by a pass still more to the E. than those he had before crossed, with the intention of exploring the lakes Rákas-tál and Mánasarowar, which had not been visited by any European since the time of Moorcroft and his companions, 34 years before. In this he was most successful, having gone round the northern end of Rákas-tál, returning between the two lakes along the edge of Mánasarowar, and finally re-entering the British territory at the extreme N.W. point of the frontier of the kingdom of Nepaul. The geographical results of these two journeys were embodied in a map drawn up by him on his return; and a detailed account of his latter expedition has been published in the *Journal of the Asiatic Society of Calcutta*. The arrangement of the drainage of this remarkable region was now for the first time correctly made out, and the elevation of the lakes satisfactorily determined. Besides this, much curious information as to the government of this part of Tibet was procured, which his later investigations have shown to be substantially correct.

These two expeditions were undertaken altogether at Captain Strachey's own risk and expense, and were accomplished through the personal energies which he displayed in overcoming the opposition of the frontier Tibetan authorities. In the following year, however, the Indian Government having determined to send a commission to determine the boundaries of the territories of Raja Goolab Sing, Captain Strachey was one of the officers selected for the duty, and on him devolved the geographical work of the mission. He left Simla in the autumn of 1847, and, having passed the two succeeding winters at Lé, the capital of Ladák, he returned to the British provinces in the autumn of 1849. With the exception of the winter months, in which travelling is impossible in that elevated region, Captain Strachey was constantly employed during these two years in prosecuting his explorations in various parts of the country, the results of which are embodied in his map; this will sufficiently show the careful manner in which his examination was made.

The map represents a region of about 500 miles in length, by 150 miles in breadth, of which Captain Strachey has himself traversed a length of more than 400 miles. Of this again 200 miles being under

Chinese dominion, it is consequently most jealously guarded to prevent the entrance of any foreigners; and it is therefore most creditable to our Medallist that he has been thus successful in prosecuting his explorations in a manner in which no former traveller in those regions was ever enabled to do. The topographical details of this map are given with minuteness, and the elevations of the places have been noted with great care. Much attention has also been paid to the orthography, a matter of no less importance than difficulty—and one deserving of more attention from travellers than it usually receives.

Besides the accurate detail of the courses of the main branches of the Indus and Ganges which are presented in this map, Capt. Strachey has for the first time imparted to the physical geographer the important fact, chiefly derived from a journey of Dr. Thomson, to which allusion will afterwards be made, of the unity of the great mountain mass that stretches along the northern boundary of Hindostan. To use the words of his brother and associate in the preceding number of our Journal, he has shown "that neither the Kouentun nor the Hindlayas, as marked upon our maps, have any definite special existence as mountain chains, apart from the general elevated mass of Tibet. That rugged country thus seems to form the summit of a great protuberance above the general level of the earth's surface, of which these two chains form the north and south faces."^a

In addition to these purely geographical data, Captain Strachey has collected a mass of information relating to the climate and statistics in general, and has embodied the whole in an elaborate Report to the Government of India, which elucidates the physical characters of this very remarkable region, as well as the condition of its inhabitants. An abstract of this Report will shortly be presented to the Society, accompanied by an outline map reduced from the large surveys which have been exhibited.

In concluding this notice of Captain Strachey's researches, I cannot but call your attention to the hardships inseparable from the life of a traveller in such a country as Tibet, where mountains of the most rugged and inaccessible character, rising at almost every point into the region of perpetual snow, present difficulties inferior only to those encountered by the Arctic voyager.

The President then delivered the Patron's Medal to Captain Richard Strachey, and said—

"Captain Richard Strachey, In the absence of your brother, I have true gratification in placing in your hands the gold medal bearing the effigy of our gracious Queen, and granted for researches in the Himalaya mountains, in which, as our volumes testify, you have also taken a distinguished part. I beg you to assure him that his services have not only obtained the approbation of the Council of this Society, but also that of the most competent of all juries, his contemporaries and brother-travellers in other parts of the Himalaya; and I feel confident that this award will be highly approved by the illustrious Humboldt himself, whose greatest ambition, during the last half of

^a Journal of the Royal Geographical Society, vol. xxi. p. 58.

his life, has been to traverse these mountains, the mightiest on the face of the globe."

To this Captain Strachey replied as follows—

"Mr. President, I shall have great pleasure in communicating to my brother the honour that has been conferred upon him by our Council in selecting him to receive one of the Society's Medals, an honour which he had not at all expected, and which I am sure he will appreciate very highly. Under no circumstances would it become me to attempt a panegyric of my brother, of whose merits I may hardly be supposed to be a very impartial judge, and I am therefore happy to find that I am altogether relieved from any such task by the very kind manner in which you have expressed your sense of his services in the cause of geographical science. I may, however, express my satisfaction at the recognition that has just been made, by those best qualified to judge on such matters, of the importance of the explorations that have recently been made in all parts of the Himalaya, which will most certainly be found to have very greatly increased our knowledge of this remarkable chain of mountains, when they are fully laid before the public.

"Allow me, Mr. President, again to thank you on behalf of my brother."

Note by the President.—Since the Anniversary Meeting of the Royal Geographical Society, the Hudson's Bay Company have, to their great honour, determined, on the suggestion of Dr. Rae, to send another expedition, under the command of our Medallist, to complete the survey of the coast of Arctic America, a small portion only of which, along the west shores of Boothia, still remains unexplored. The party will quit York Factory about the middle of June 1855, and, proceeding by the coast to Chesterfield Inlet, will leave the larger of two boats there, and, crossing to Back's River, will descend it to the sea and thence advance northwards as far as may be desired. If the weather should prove favourable, this exploration may be accomplished in one summer; but if not, Dr. Rae is quite prepared to pass another winter in those desolate regions, and we may hope more comfortably than during his former residence in Repulse Bay.

ADDRESS

TO THE

ROYAL GEOGRAPHICAL SOCIETY OF LONDON;

Delivered at the Anniversary Meeting on the 24th May, 1852,

BY SIR RODERICK IMPEY MURCHISON, G.C.S.S., M.A., F.R.S.,

MEMBER OF THE ACADEMIES OF ST. PETERSBURG, BERLIN, COPENHAGEN; AND
CORR. INST. OF FRANCE, &c.,

PRESIDENT.

GENTLEMEN,—Succeeding to a President who combined in his own person the powers of the astronomer, archaeologist, and mechanician, and who as a navigator had successfully surveyed large maritime regions, I cannot but feel how inferior are my special qualifications to preside over you. But as geography, in its comprehensive range, embraces so much of science and art, you have, doubtless, accepted my services under the belief that in my own walk I may perchance be able to do something to advance our acquaintance with the world's surface, and that, by devoting myself warmly to your cause, I may strengthen the bonds of good fellowship by which we have been held together. At all events, as you have once more had recourse to an old friend who pretends not to wield other instruments than his hammer and compass, and whose chief knowledge of terrestrial phenomena is confined to the earth's outline and subsoil, you already know all that can be obtained from him.

Let me preface what I have to say on the progress of our science by at once expressing the gratification I experienced when entering upon my duties at our last anniversary. I found that our geographical vessel had been so ably piloted through the shoals with which she had been surrounded, and that her crew (augmented by many stout hands) was in so healthful and sound a condition, that it

would be easy for me to steer her onwards with the same genial trade-wind in which her good commander had transferred her to me.

I have, indeed, true pleasure in saying, that the present flourishing condition of the Royal Geographical Society is mainly due to the skill and moral courage with which Captain Smyth conducted your affairs, supported as he was by an efficient Council, and our zealous Assistant-Secretary and Editor, Dr. Shaw.

The movement in the right direction has, I am happy to say, been fully sustained in the past year. Numbering 611 at the last anniversary, our list has now swelled to 645 members, besides eleven candidates whose names are now announced. We have no debts, and our income has largely increased. Our spirit is, I am confident, as good and hearty as that of any society in the Metropolis; and if this "*esprit de corps*" should have been, in any degree, increased by my efforts to engage you to meet together in my own house with other men of science, literature, and art, one of my objects will have been attained.

But notwithstanding many signs of prosperity, we have not yet obtained that befitting place of meeting which has so long been our great desideratum, and in which we can conveniently assemble, and make a proper use of our numerous collections of maps and charts. Last year, when the afflux of foreigners to the Great Exhibition took place, the geographers of Britain were—thanks to the Principal and Professors of King's College—enabled to assemble in a convenient hall; and through an equal degree of liberality on the part of the noble President and the Managers of the Royal Institution, we have, during the greater part of this season, been gratified with the use of their theatre.

When I formerly presided over you, I endeavoured to impress on the then Minister of the Crown, the desirableness of granting the same amount of support to the Royal Geographical Society, in the use of rooms, which had been awarded to some other scientific bodies. But, in order now to bring our claims more prominently before Her Majesty's Government, I recently presented, on the part of the Council, a memorial to our Vice-Patron, Prince Albert, requesting that His Royal Highness, with the love of science which characterizes him, would be pleased to ask the Queen, our gracious Patron, to place us in a position, in which the Royal Geographical Society might open out its useful resources to Her Majesty's subjects. Indicating how much we might accomplish by researches and publications, if only relieved from the cost of most inadequate apartments, I pointed out to His Royal Highness, that so small was our present meeting-room,

that the valuable framed maps which had been presented to us by the Emperor of Austria (after due exhibition in the great Crystal Palace) could not be introduced, and had in consequence remained upon the walls of our staircase! It was further represented that, from its connexion with the Foreign, Colonial, and other offices of Her Majesty's Government, and from the useful nature of its publications in developing new marts of commerce and industry, this Society was entitled to, at least, that limited measure of public assistance which had been meted out to other scientific bodies.

Again, our Royal Vice-Patron was informed that, if we should be favoured by the grant of apartments, or an equivalent consideration, the Society would repay its obligation to the country by rendering one of its rooms a "map office" of the British nation, in which all persons might have access to maps, charts, and plans, many thousands in number.

Let us hope that this proposal will have its due weight; for surely England, with her vast colonies, and with interests pervading so many regions of the globe, ought to be furnished with at least one good general map office: and this we offer to the public, at a cost to them of no more than the salary of an official clerk, or at no cost at all if any vacant apartment can be found for us.

I firmly believe that the enlightened economists of our country will cordially support in Parliament a moderate grant of a few hundred pounds annually for such a truly national object; and, at the same time, I feel confident that the petition which in your name I have had the honour to present, could not have gone into the hands of any one more anxious to promote its success than the illustrious Prince to whom it is confided.

OBITUARY.

In the performance of the unwelcome task of bringing before you the names of the members, who have been taken away from us in the past year, I shall only especially allude to those who have been connected with us by scientific ties.

Vice-Admiral Sir Charles Malcolm, our late Vice-President, so beloved by you all, died at Brighton on the 14th of last June, of an attack of paralysis, in his sixty-ninth year. He was the tenth and youngest son of a Dumfries family, of which, it will be remembered, three of his brothers attained distinguished eminence as warriors and scholars—namely, the late Sir James Malcolm, K.C.B., colonel of the Marines; Admiral Sir Pulteney Malcolm, G.C.B.; and General Sir

John Malcolm, G.C.B., the historian of India, and former envoy to Persia.

Sir Charles entered the Royal Navy in the year 1791, and afterwards sailed to India in the 'Fox' frigate, commanded by his brother Sir Pulteney, where he obtained a lieutenancy, and became a commander in 1801. It is not within my province to follow him through his subsequent naval career when in command of the 'Eurydice,' 'Narcissus,' 'Rhin,' and other ships, in each of which, I am informed, he won golden opinions; but I may announce that his appointment to the superintendence of the Bombay Marine, to which he gave the more appropriate designation of "Indian Navy," was an event of some import to this Society, from his warm patronage of every branch of naval knowledge and research. In the ten years, during which he held that responsible post, he instituted various extensive and important surveys; and he was especially anxious to advance our acquaintance with the N.E. regions of Africa, and to open the commerce of the Somali coast to British enterprise. In instituting the Geographical Society of Bombay, to which he communicated several memoirs, he manifested great attention to our interests; and when Captain John Betham, of the Indian Navy, published his concise method of obtaining the latitude by the Pole star, he dedicated the work to Sir Charles as a sincere tribute to his promotion of science.

In his later years Sir Charles was distinguished by his untiring attention to this Society; to the Ethnological Society, of which he was the President; and to various professional institutions and charities. Indeed, it may be truly asserted that he was a gallant, liberal, and estimable British officer. No man ever more effectually carried his heart into every undertaking destined to benefit his fellow-creatures; and, knowing as I do the real value of his active co-operation in maintaining our interests, whether literary or material, I declare that the Society could not have sustained a greater loss than in the decease of the good Sir Charles Malcolm.

Mr. Bartholomew Frere, who was born in 1776, was a brother of several able and variously distinguished men; one of whom, the Right Hon. J. Hookham Frere, was the intimate friend of the illustrious Canning. Educated at Harrow, and having gained high classical honours at Cambridge, Mr. B. Frere served successfully as a diplomatist for many years in various countries, and was for some time the *Chargé d'Affaires* of the British Government at the Ottoman Porte. As the representative of the interests of the African Association, a body which joined us soon after our origin, he was for nearly twenty

years a member of our Council, of which, being a well-read geographer and a first-rate scholar, he was a very efficient member; his just, calm, and perspicuous views having frequently proved of great service to us in the preparation of memoirs for the press.

Every one who knew how these accomplishments were united, in Mr. B. Frere, with the finest qualities of the heart, a playful wit, and the most engaging manners (*mitis sapientia Laeli*), will join with me in this brief but genuine tribute of regard to the memory of our learned and estimable colleague, and in the expression of our deep regret that he has been taken from us.

The late Earl of Derby was a nobleman, through whose munificent exertions the science of natural history has most largely benefited, and of which he was a worthy representative as a Trustee of the British Museum. His menagerie and museum at Knowsley Park were indeed worthy of an English Earl, and may be said to have rivalled, if they did not excel, the collections made even by sovereigns; the live animals amounting to 1617 individuals, and occupying 100 acres of land. It is not my province to enumerate the great additions which the Earl of Derby made to our acquaintance with the races of creatures which inhabit distant lands; but I may state that, in his zeal for their acquisition, he not only spared no expense, but also employed men of capacity to procure them, who occasionally contributed new geographical data. Thus, his zoological and botanical collectors in Africa, the Honduras, and the Rocky Mountains, were directed by him to obtain whatever information might be within their power for communication to the Royal Geographical Society; and among the contributions thus offered to us, through the medium of Mr. J. E. Gray, a journal with a map of a part of S. Africa, explored by Mr. Burke, may be specially mentioned.

As long as his health permitted it, the late Lord Derby was an active President of the Zoological Society of London, to all the members of which he endeared himself by his kind and conciliatory manners. To that body he was always a most liberal contributor, spending large sums of money annually in new illustrations and in the augmentation of its library; and he left to it at his decease gifts of most valuable animals: his Lordship's museum of preserved birds and quadrupeds was bequeathed to the town of Liverpool.

The late Lord Viscount Melville, though not a man of science, must be specially alluded to on this occasion, as having been the First Lord of the Admiralty, under whose auspices all those earlier Arctic Researches which were advocated by Sir John Barrow were liberally fostered and successfully carried out; his name has therefore been most properly

affixed to the largest and most interesting of all the Northern Islands discovered by Sir Edward Parry. Lord Melville was a right-minded and benevolent man, who administered the important charge committed to his care with fidelity and ability; in private as in public life he was universally respected.

Commander Frederick Edwin Forbes, R.N., an active young officer, died on the 25th of March, on board Her Majesty's ship 'Tortoise,' at the age of 34 years. He entered the Navy in 1833, served through the war against China, and afterwards on the Coast of Africa, where, in the command of the 'Bonetta,' he captured several slavers, and discovered the curious written Negro language now known as the Vahie or Vei, which was published in the 20th vol. of the Journal of this Society. As late as the 31st of December of last year this eager member of our body wrote to Dr. Shaw, informing him that he had sent "An Outline of Abbeokuta, with specimens," to the Admiralty, which he hoped would be transmitted to this Society. To this he added, "We are here on the eve of a tremendous fight. I am opposed to the King of Dahomey, and am General-in-Chief of the Eghas, with 40,000 soldiers, whose chiefs call me Babba, i. e. Father." Like his late friend Mr. Duncan, he was attacked by the dysentery, and although at once moved on to the coast and placed on board ship, he expired two days after leaving the land. Commander Forbes' work on 'Dahomey and the Dahomans,' published in 1851, was presented by him to the library of this Society shortly before he sailed from England to join the 'Penelope' flag-ship, on special service from the Foreign Office.

In addition to those members who have thus been mentioned, we have further to regret the loss of the following gentlemen; viz. Mr. H. Broadley, M.P.; Mr. Wade Brown, M.A.; Rev. J. Edmonston; Mr. James Goding; Mr. R. Hollier; Mr. A. Maxwell; Hon. F. Ponsonby; Capt. R. Russell, R.N.; and Mr. E. J. Wallace.

Of Foreign Honorary Members we have lost four, whose names will live with credit through future ages—Walckenaer, Schouw, Inghirami, and Clarke.

Charles Athanase Baron de Walckenaer, who died recently at Paris at an advanced age, was a member of the Academy of Inscriptions and Belles Lettres (of the Institute of France), and of which during the last 12 years he had been perpetual secretary. Though he was the author of works which have procured for him an European fame as a writer on geography, it is to be noted that his first appearance in the world of letters was as a naturalist, and by publishing works on

the Arachnidæ, which gained him the notice and friendship of Cuvier. Soon, however, abandoning that career, M. de Walckenaer edited the first edition of Azzara's '*Voyages dans l'Amérique Méridionale.*' Indeed, we learn from himself, that, amidst all his accomplishments, his real passion was comparative geography, and of this he gave a most successful proof in his remarkable work entitled '*Géographie Ancienne, Historique et Comparée, des Gaules Cisalpines et Transalpines*'—a work which obtained for him one of the great prizes of the Institute, and subsequently a place in that illustrious body. Eminent geographers, such as Delisle, D'Anville, Rennell, Gosselin, and Vincent, had admitted the vast difficulty of comparing ancient and modern geography, arising in a great degree from the uncertainty as to the measures of length referred to by classical authors; but our perspicuous and indefatigable associate overcame all such obstacles.

M. de Walckenaer published other works on ancient and modern geography, an historical view of the East, Polynesia, and Australia, on the interior of North Africa, besides a general history of voyages and travels and many detached memoirs.

He was also an accomplished biographer, having given to the world the '*Life and Writings of La Fontaine,*' the '*Life of Horace,*' and the '*Memoirs of Madame de Sévigné;*' by the last-mentioned of which works he is perhaps best known to the general reader. The first lines in it show how well he could impart the artistic feeling of a geographer to a literary production; for the old castle of Bourbilly, in which the inimitable authoress was born, is there placed before us by the hand of a master, as surrounded by its meadows, slopes, rocks, and river.

M. de Walckenaer, who had been employed in the civil administration of Napoleon, became Secretary-General of the Department of the Seine at the Bourbon restoration, and was created a Baron in 1830. He was one of the most frequent attendants at the meetings of the Academy, of which he had been a member since 1813, and was, when he died, a Vice-President of the Geographical Society of France.

Professor Schouw, of Copenhagen, another of our foreign members who has just departed this life, had justly attained the very highest celebrity from the light which his works have thrown upon the geographical distribution of plants, and on the effects of climate on animal and vegetable life. The mere enumeration of his publications which are in the library of this Society would be sufficient to prove how eminently he was entitled to the honourable place we assigned to him among geographers, and which, in the opinion of our eminent associate

Mr. Robert Brown, the President of the Linnean Society, he most fully merited.

That Denmark can send forth admirable botanists we well know, in happily possessing among us Dr. Wallich, the historian of the plants of Hindostan; but never has she produced a man whose name stood so high in general reputation for the value of his broad philosophical views on the geography of vegetation, as the truly eminent Schouw.

In foreign countries, where men of science are found to be occasionally useful members of the Government, and are not almost "inbowed" as in our own land, Professor Schouw was not only a Councillor of State, and a representative of the people, but also the President of the Danish House of Commons, as well as the Director of the Royal Botanical Garden of Copenhagen.

Proud, indeed, may the small kingdom of Denmark be to have produced such contemporaries as Oersted and Schouw; and grievous is it to reflect that they have departed this life in the same year. Although the illustrious philosopher Oersted was not a member of our Society, and did not take a part in the details of our pursuits, his discovery of the intimate relations between electricity and magnetism constituted not only the basis of the subsequent discoveries of our own Faraday, but also connects itself with a large branch of physical geography, which in the hands of Sabine, Dove, and others, has opened out a vast field of inquiry, and has already obtained grand and important results.

As few philosophers ever lived who more merited a recompense than Oersted, so it is to the infinite credit of the late and present sovereign of Denmark that he enjoyed every honour and comfort to which a leader of science could aspire; one of the last proofs of which was the conferring on him, by the reigning King, a residence near Copenhagen, which has worthily passed to my esteemed friend, Professor Forchhammer.*

Would that the venerable, good, and eminent philosopher, who was the chief ornament of the meeting of the British Association in 1846 over which I had the honour to preside, had survived a few years longer, if only to enable some of his foreign friends and admirers to visit him in a residence worthy of him. I shall, indeed, be ever proud of having been honoured with the intimacy of this illustrious Dane, who but a very short time before his death had forwarded his philosophic work, the '*Spirit in Nature*' (*Aanden i Naturen*), to Dr. Norton Shaw, in the hope that it might be translated into our language.

* See a Memoir of Hans Christian Oersted, by Forchhammer, read before the Royal Danish Academy of Sciences, Nov. 1851.

The Padre Giovanni Inghirami of Florence, one of a noble family of Volterra, and brother of the distinguished expositor of Tuscan antiquities, was the author of an excellent map of Tuscany which I have found to be of great service in geological explorations of the Apennines; of numerous papers on astronomical subjects in Zach's Correspondence, amongst which may be mentioned, connected with our subject, his calculations for occultations, for M. Rüppell during the geographical labours of that eminent traveller in Africa; and of a Celestial Atlas of a portion of the Heavens: he was also highly esteemed by my predecessor for his geodetical skill, and for contemporaneous observations during Captain Smyth's survey of the Mediterranean. His numerous publications may be known to most of you, but his treatment of a terrestrial condition, which he called lateral refraction, was, I am told, entirely new. "You are aware" (Captain Smyth writes to me) "that the refraction of light by the atmosphere is very great when the visual ray is nearly horizontal, and hence arise great errors in the measurement of angles, whether the observed objects are in the same level or not. These errors were generally palliated by an empirical law, or avoided in a degree by seizing the most propitious moment for observing. In this state of the question, Inghirami suggested corrections applicable for terrestrial refraction in the varied states of rarefaction or of moisture, in which the lower strata of the atmosphere are found."

The Padre Inghirami, who died recently at Florence, had for many years been at the head of the distinguished religious Order of the Scelopii, which has produced many eminent scientific men, the object of the Order being public education on a liberal basis: hence their persecution by the Jesuits.

The hand of death has been sometimes extended to our honorary foreign members without our being aware of it, and such has been the case in relation to General W. Clarke, of Missouri, whose name has accidentally been retained on our lists, though he died at his residence at St. Louis, in that state, in September, 1838. Our honorary and esteemed associate of the same great nation, Mr. Schoolcraft, has called my attention to this point, and has enabled me to give the following brief sketch of the career of his distinguished countryman.

General Clarke was of English descent, his father having, it is believed, commanded a troop of British horse during the American war. Possessed of a strong and vigorous mind, and being of commanding stature, he was a fine representative, mentally and physically, of the Anglo-Saxon race in America. His celebrated journeys

with Mr. Merriwether Lewis to Oregon opened out the career of geographical discovery in the vast area of the Upper Valley of the Mississippi, where cities and states are rapidly rising to cover the wildernesses and buffalo-grounds first explored and described by our deceased associate. General Clarke filled some offices of the highest trust under the Federal Government, was much respected through life, and exercised a beneficent and controlling influence over the Indian tribes which extend to the foot of the Rocky Mountains.

ARCTIC RESEARCHES.

When quitting the chair of the Society in the spring of 1845, I announced the departure of my valued friend, Sir John Franklin, on his third expedition to determine the problem of a north-west passage: I then felt the fullest confidence, that everything which could be mastered by human skill, and a chivalrous devotion to the object, would be accomplished by that eminent navigator and his associates. Alas! that seven years should have elapsed without tidings of them; but honour to the Englishmen who still cling to the hope that these brave men, or a portion of them, may yet be discovered, and who cheer on the new expedition which has just left our shores under Sir Edward Belcher and Captain Kellett—men whose resolution, knowledge, and experience, well qualify them to carry out their arduous mission of tracking their long absent friends. On the last day which he passed on the shores of N. Britain, Sir E. Belcher thus wrote to me from Stromness:—"One feeling seems to pervade us all—a stern resolve to deserve a little of what has been too freely supposed we may merit. Under the blessing of God, we hope to prosper; but our predecessors have left us a hard game to play. I can, however, foresee much interesting matter for the Geographical Society, even if the great object of our mission be not successful."

As it is not my part to advert, on this occasion, to the efforts which have been made in former years to obtain intelligence of the missing expedition, I will simply take up the subject from the point at which my predecessors left it.*

The Reports of the recent Arctic Committee, composed in great part of eminent northern navigators, have elicited graphic accounts of the services performed by Captains Austin and Ommanney, and the officers under their command, in exploring the bays and headlands beyond Barrow Strait. The diaries of the officers who were detached

* See a very useful compendium of the recent "Arctic Searching Expeditions," by our associate, Captain Mangler, R.N. Second Edition. 8vo.

with sledges to search in different directions from their winter headquarters, and particularly the lively and highly descriptive work just published by Lieut. Osborne, afford pregnant proofs of what can be accomplished by British officers and seamen under severe privations.* In conjunction with the journeys of Dr. Rae, of which I have already spoken in presenting our Founder's medal, they have satisfied us that Franklin's expedition could scarcely have passed to the south or west from Barrow's Strait; and as the greater part of Baffin's Bay has been tracked, we are now more than ever led to believe that, if not submerged, the gallant explorers must really have passed through Wellington Channel. The chart of the Discoveries in the Arctic Sea up to 1851, recently published by the Admiralty, is, in fact, the document on which geographers may scan the merits of those zealous men. By reference to it, and to a general map prepared by Arrowsmith, we now see at a glance how much new territory was delineated by each of the officers detached by Captain Austin, and also how far Captain Penny extended his researches to the north of Wellington Channel into what is termed the Queen's Channel and Penny's Strait in the Admiralty document. The last-mentioned exploration of an experienced polar seaman, in sketching the outline of grounds between which Sir Edward Parry saw an open channel of water in the year 1819, when combined with the relics found at Beechey Island and Cape Riley, has also led to the belief, which is prevalent, that Franklin really passed through Wellington Channel.

One portion of the new expedition (we are now informed by the published Admiralty instructions), after making a searching examination for despatches or relics of Franklin between Beechey Island and Cape Bowden, will, if circumstances require and permit, penetrate northwards by the Wellington Channel; whilst another portion will proceed to Melville Island, and, after wintering there, make a spring excursion. In this way it is supposed the explorers may detect and follow up the track of the missing navigators, or perchance succour Captain McClure, who forced his way into the ice from Behring Strait, purposing to reach the north shores of Melville Island to the north-east. If, on the other hand, possession should in the first instance be obtained, at or near Beechey Island, of any despatches of Franklin intimating his intention of returning from that point, then, of course, the expedition will also

* Of the officers under Captain Austin who travelled in sledges, Lieut. (now Commander) McClintock accomplished the greatest distance, viz. 760 miles along the south coast of Melville Island. This, however, was exceeded by Captain Penny, who, according to Arrowsmith's map, travelled 930 miles in exploring northwards from Wellington Channel.

return, endeavouring by the way to determine the fate of our brave countrymen, who in that case may have perished in Baffin's Bay.

Whilst these efforts are being made from the north-west, our recent researches from the north-east by Behring Strait have, I regret to say, been confined to sending out stores by Captain Maeguire, with instructions to advance the 'Plover' with some of those supplies beyond Cape Barrow, so as to afford a support to the crew of the adventurous navigator McClure, who, having out-sailed his Commander, Capt. Collinson, had passed to the north-east, and has not been heard of since he entered the ice.*

As there exists no clear evidence of the route taken by Sir J. Franklin, we cannot speculate with confidence on any one line of research being more likely to succeed than another. The presumptive evidence, however, being much in favour of his having forced through Wellington Channel, after having waited for some time at or near Cape Riley, the Admiralty has judged wisely in directing the chief efforts to that point. At the same time, it is much to be regretted, that a simultaneous national endeavour could not have been made by the employment of a *steam-vessel* from the side of Behring Strait, and by extending the researches of Captain Kellett in his sailing vessel, the 'Herald,' beyond the island named after her. That gallant officer having all along been of opinion that an application of steam power in Behring Strait might prove successful, in enabling the explorer to work round to *meet* Franklin through lanes of water between Siberia and the northern packs of ice, until an open polar sea might be reached, it was with true gratification that I made every exertion to forward two successive projects, in which the Council and Members of this Society took as deep an interest as Lady Franklin and myself.

Many persons who know that it was the resolve of the inflexible Franklin to penetrate, if possible, by the north-west into an open polar sea, and to navigate in it until he reached the longitude of Behring Strait, have thought that, if he really passed through Wellington Channel, and did gain such a sea, he may have made considerable progress westward; and that then, if compelled to abandon his ships, he might have taken refuge on land, where some of our countrymen may

* Capt. McClure intended (as expressed in a letter to Sir George Back, dated July 28, 1850, from Kotzebue Sound) to take the first opening in the ice, and try for Banks Land, being careful not to be caught in the bight to the S.E. near Boothia: his next object being to get to the northward of Melville Island, and afterwards to try to pass to the S.E. by the Wellington or some other channel, all of which operations, as this brave man estimated, might be so accomplished as to enable him to return home, at latest, in 1853.

still be living on the natural produce of the region, but cut off from all communication with countries to which we have access.

It is this idea, mainly founded upon the character of Franklin, which has induced many geographers to attach value to such an hypothesis. On this ground we supported the bold project of Lieut. Pim, one of the officers of Captain Kellett, who proposed a plan of research by which he hoped to go far beyond the tracts formerly explored by Admiral Wrangel. Travelling over Siberia to the extreme edge of the Russian settlements (a journey which occupies the past six months), he designed to traverse the wilds of the Tchukchi race, and from their shores to pass over channels of water in India-rubber or skin canoes, to tracts inhabited by the most northern Eskimaux, and there endeavour to learn the fate of his countrymen.

When this arduous scheme was first mentioned to me, I foresaw considerable difficulty, though not all the obstacles with which it was beset; but as at that time the intrepid young officer had obtained the approval and countenance of Her Majesty's Foreign Secretary,* and was certain to proceed to St. Petersburg, I felt it to be my duty, as your President, energetically to support the enterprise. I did so, however, on the express condition (and my letters to the Imperial authorities were so penned) that the expedition must be entirely arranged and executed by the Russian Government. I was led to hope that, as thirty years had elapsed since their voyagers, Wrangel, Anjou, and Matiushkin, had explored those inhospitable snowy deserts, the Imperial Government might wish to renew and extend such inquiries, and thus become better acquainted with the outlines of north-eastern Asia.

This view was warmly supported by the illustrious Humboldt and by Adolf Erman; and Colonel Sabine, having instructed Lieut. Pim in the method of taking magnetic observations, stated to me that a few of these correctly made in the north-east of Siberia would be worth the expedition, for their important bearing on terrestrial magnetism. The first Minister of the Crown† had granted a sum in aid, and everything seemed for a while propitious; whilst the King of Prussia bestowed marks of kindness on the young officer as he passed through Berlin; and Sir G. Hamilton Seymour, the British minister at St. Petersburg, most kindly entertained him.

The reports, however, of the Russian authorities to His Imperial Majesty, particularly a document prepared by Admiral Matiushkin,

* Viscount Palmerston.

† Lord John Russell.

were adverse to the renewal of any such enterprise. They represented that, in order to enable travellers, furnished with instruments and interpreters, to traverse the ultra-Siberian country of the Tchuktehi, previous arrangements of eighteen months would be required to assemble the necessary quantity of dogs and sledges; and that, as the former expedition had, by withdrawing the use of many of these animals, produced fatal diseases among the natives and a great mortality, such an extraordinary effort ought not to be renewed without motives of overwhelming necessity.

In short, being informed that such an expedition could not be put in motion before March, 1853, and being aware of the responsibilities which they would be led into, whether as respected their relation to the native tribes, or to the young British officer whose life they thought would be uselessly perilled, the Imperial Government declined to co-operate in the project. At the same time they gave Mr. Pim permission to travel in any direction he pleased through Siberia; but by my own advice and that of other friends he reluctantly abandoned the scheme. On his return from St. Petersburg he immediately volunteered to serve again under his old commander Captain Kellett, and he has now sailed with the Arctic expedition; not, however, before he had, with the sanction of our Premier, handed over the balance of the sum advanced to him to help on another expedition to Behring Strait. Let me further state, that whilst he was in Russia, our countryman received marked attention from the Court, and from the Imperial Geographical Society, and even had an interview with the Emperor. And, if this scheme was frustrated, I must assure you that his Imperial Majesty has not ceased to desire to afford every countenance to those expeditions in search of Franklin which, in his opinion, offer any chance of success.

For example, Captain Macguire, R.N., having been suddenly ordered off to take command of the 'Plover' in Behring Strait, and being charged to leave a quantity of his supplies at the Russian Fort of Michaelowski, it became necessary to have authority to do so, and instantly on application to Baron Brunnow, who was well acquainted with the wishes of the Emperor, the requisite letters were furnished. Again, when requested to succour the private expedition to Behring Strait, which was to have proceeded under Mr. Beaton, the Imperial Government cordially responded, and furnished passports and recommendations to the Imperial officers on the Asiatic and American shores of that sea, for the use of this private expedition.

I am thus led necessarily to make the painful announcement that this

last mentioned enterprise, for which many of us have subscribed, has been suspended, and that the hope of entering with any vessel far into the ice this season, between Siberia and the "unknown" north, is at an end. Want of adequate means, and the unexpected personal embarrassments of the ingenious commander, to which it is unnecessary here to refer, have prevented the departure of the 'Isabel,' *the only screw-vessel* which had been prepared for service in a quarter where, in the opinion of Captain Kellett and others, she was admirably qualified, from her form, build, and fittings, to accomplish the happiest results.

Up to a late date I entertained a hope that the Board of Admiralty, which, with the kind sanction of the Noble Duke at its head, had supplied the 'Isabel' with pemmican, certain other provisions, and coal, and had directed a steam tug to help her out to sea, might think it desirable to employ this good vessel in their own service, by despatching her to Behring Strait. But as this plan does not enter into the views of our naval chiefs, let us hope that they may yet think fit to employ in some way this ship, if only to carry out that additional quantity of provisions, with which she is already stored, to the Arctic squadron under Sir E. Belcher. By this plan the noble efforts of Lady Franklin (who has contributed much more largely than all the subscribers united to the outfit of the 'Isabel') would be recognised, and the wishes, I venture to say, of all promoters of the expedition satisfied; for every one must know, that the shortcoming of provisions has before now been the main cause of Arctic researches being prematurely checked. Again, it may be noted that, if so employed, the 'Isabel' could, after leaving her supplies at Beechey Island, return to England this autumn with accounts of our absent explorers, and be ready for a spring voyage, if required, to Behring Strait or elsewhere.

The extraordinary excitement which has been produced by the appearance of two half-wrecked ships which were said to be seen floating southwards upon an ice floe in north latitude, along the shores of Newfoundland, by persons on board the ship 'Renovation,' on the 21st of April, 1851, is a manifest proof of the deep interest which is still taken in the fate of Franklin and his crews. Some navigators considered that this appearance may have been a delusion, which might easily have operated on the mind's eye of persons who for the first time saw a floating mass of ice. But I agree with naval friends who have looked into this case, that the evidence is too clear and circumstantial to allow us to doubt that the objects were vessels. We must also bear in mind that the tract to the south of St. John's is precisely that in which we know, from the excellent ice-chart of Mr. Redfield, such floating ice

prevails, and occasionally in great quantities.* This author has demonstrated that very large masses of floating ice, sometimes miles long, not only abound where the 'Renovation' was sailing, but extend to the south of the 40th degree of N. latitude; occurring even in the Gulf-stream, and chiefly between 45° and 55° W. longitude. As to the position of these ships, we know, from the sketches of our Vice-President Sir G. Back, how a ship forced by the irresistible pressure of the ice high on the pack, and wedged there for four months, may be, as his ship the 'Terror' was, on her beam ends one day, heaved out of water another, and upright, though a wreck, upon a third. Nor does it appear that any good reason can be given, why a large field or floe, in which ships had been frozen up, should not have so broken up, after some years perhaps of congelation, on a great scale, that it might transport the vessels to vast distances, partly imbedded in, or firmly attached to, its rough and hummocky surface; as the keel of the 'Terror' was on the occasion alluded to. Any one who has seen the condition of the surface of ice on the Russian lakes, or at the mouth of a great northern river, in the spring, can easily realize the idea that ships might just as easily be transported to considerable distances as the huge blocks of stone which such floes have been known to carry. It is the last-mentioned fact which has enabled the geologist to explain how, in former periods and when our lands were submerged, colossal blocks were wafted to vast distances from their parent rocks, and dropped to the bottom of a former sea when their ice-rafts melted.

Granting that two ships were seen floating on ice, it is possible, say some persons, that they were the 'Erebus' and 'Terror,' which had been abandoned long ago in a far northern sea (the Polynia of the Arctic circle), and, if so, that their crews may have taken refuge on the nearest adjacent lands. In obedience to the drift, the floating ice may (they add), for aught that any one can gainsay, have made a coasting voyage unknown to man, by trending along a northern but undiscovered shore of Greenland and then descending to Newfoundland in the great current which sets in between Greenland and Iceland. Or, taking a much more limited view, others suggest that the ice-floe with its ships may simply have been dislodged from one of the numerous deep bays or inlets of Baffin's Bay. Not pretending to form a definite opinion on either of these hypotheses, I will only say that the barest possibility of these ships having been the 'Erebus'

* * On the Drift Ice and Currents of the North Atlantic, with a chart showing the position of the ice at various times.—*American Journal of Science*, vol. xlvii. p. 373.

and 'Terror' (and some naval men believe it to be possible) is a strong reason for renewed exertion to discover our absent friends or their relics in the lands to which they may have repaired.* Even if it be supposed that the ships were ordinary whalers, still the fate of their crews ought if possible to be ascertained.

In the idea that any of our countrymen (if only the most active portion of them) may have been eking out an existence in polar lands, cut off from all intercourse with civilized men, we have indeed redoubled cause to make fresh efforts to exhaust the survey, and to leave no chance untried. For, when such good Arctic naturalists as Richardson and Scoresby, such an able seaman as Kellett, and such a practical explorer of snow-clad lands as Rae, coincide in the belief, that animal food sufficient to sustain life may have been found, why are we not to indulge in the hope, that some of our long-absent friends may yet be alive, and even in a latitude as far north as that of Spitzbergen, in which the Russian sailors of the last century lived, and whence three out of four were brought home in perfect health after an exile of more than six years?

On this subject, however, it is my duty to look also at the other side of the prospect, and state that some Arctic authorities entertain a different opinion. From Captain Ommanney, for example, to whom we are indebted for the delineation of a new coast-line to the south of Cape Walker, and an instructive descriptive memoir,† we learn that the lands which he traversed are very sterile, and afford little animal sustenance. On the other hand, it is clear, from the testimony of many explorers, that animals do abound in much higher latitudes than those explored by that officer; and it is well to reflect that this unequal distribution of the means of supporting life is coincident with the direction of the isothermal lines, as exhibited on the little map of Mr. Petermann. The last-mentioned gentleman and Mr. P. L. Simmonds have collected and brought before you valuable testimony to sustain the hope, that human beings may live for many years on the natural resources of parts of the Arctic regions. Put here again we must fence round this bright prospect with all the conditions of the problem, and not be over sanguine. For, whilst we have a right to hope that our absent friends may, like the Russian sailors, have found another Spitz-

* It has been recently stated that the ships seen from the 'Renovation' were not housed in, as at first reported, and were not therefore in all probability Franklin's ships; but it must be recollected that the same party which took away the sails would also carry the "housing" ashore for purposes of shelter.

† Captain Ommanney's memoir has not yet, I regret to say, been sent in for publication.

bergen, it must also be admitted, that they may have been compelled to take refuge on coasts where few animals, save seals, could be procured, whence the birds so numerous in summer would migrate during the long season of darkness and cold; and that under such untoward conditions, their energies possibly paralysed by disease, we could scarcely suppose that even the most hardy of the brave men could have struggled on for any length of time.

Most geographers, however, I am happy to say, cling rather, like Admiral Beaufort, Capt. W. A. Baillie Hamilton, Mr. J. Barrow, and myself, to the hopeful than to the desponding side of this picture of Arctic chances. I rejoice, indeed, in presiding over a Society that does not now abandon hope any more than when the bold veteran Sir John Ross, and his nephew Sir James, who was destined so ably to explore the Antarctic seas, had been absent four years, and were quite given up by high authorities. It was then that the Royal Geographical Society flew to the rescue, and stimulated the public to effect by subscription what the British Government declined to execute as a hopeless task.

A like feeling has supported Lady Franklin through the memorable exertions she has made, to equip and transmit the 'Prince Albert,' under Captains Forsyth and Kennedy, at her own expense; to contribute much to the outfit of the 'Felix,' under Sir John Ross; and to provide largely for the equipment and purchase of the 'Isabel.' To this feeling also we owe one of the finest examples of disinterested philanthropy which history has recorded, in the conduct of Mr. Grinnell, the President of the Geographical Society of New York, who sent forth, at his own cost, an expedition of two vessels, under the command of Captain de Haven,* and which has led us to confer on that noble-minded citizen of the United States the distinction of being one of our Honorary Members.

In reviewing all that Britain has accomplished in polar researches, whether in the spirit of discovery or of philanthropy, we must not, however, forget how boldly our former rivals, the Dutch, navigated in those seas. It is even asserted that their old explorers reached to within one degree of the pole. However this may have been, we know that Barentz† advanced considerably to the north, in the great sea between Spitzbergen and Nova Zembla.

It is indeed singular that this, by far the widest—indeed the only oceanic opening towards the North Pole—should in this century have

* See the clear and unpretending official report of this good officer describing his co-operation with our expeditions.

† The Hakluyt Society will soon publish the voyages of Barentz, the English translation of which, in 1609, is very scarce.

been so much neglected, and that nearly all our recent efforts should have been accumulated upon the north shores of America, where every succeeding year has brought with it discoveries not of open sea, but of numerous masses of land separated from each other by comparatively narrow channels of water. Our associate Mr. Petermann has recalled public attention in a clear and emphatic manner to the great open highway leading to the North Pole. This laborious young German physical geographer, who is now naturalized amongst us, has shown that, whether we look to the ascertained outlines of the land, the range of the isothermal lines, the results of the annual summer debacles, issuing from the mouths of the gigantic rivers of Siberia, or to the great predominance of water, and with it a milder climate, it is to be inferred that, if a steam-vessel were to be steered during the winter or spring months directly N.E. from the British Isles, she might pass into the Polar seas in a fortnight or little more without encountering any serious obstacle, and thus be soon in a position which our own ships have been struggling to reach through defiles of land-locked water encumbered by ice.

This ingenious hypothesis seems to rest on some good preliminary data; for at Bear Island, beyond North Cape (the Cherrie Island of early English navigators), my friend, the praiseworthy Norwegian geologist, Keilhau,* the author of the '*Ges. Norvegica*,' who visited it in 1827, obtained from some seamen in Hammerfest, who passed the winter of 1823-4 upon it, certain curious meteorological data, showing the mildness of the climate in that high latitude ($74^{\circ} 30'$), where they encountered no severe cold, and saw neither packed nor floating ice in the sea. Again, in August, 1827, that very successful Arctic explorer Sir Edward Parry, proceeded, in spite of a powerful counter-current, to the most northerly point ($N. 82^{\circ} 40' 23''$) ever reached in our day, and found no bottom to the sea at 500 fathoms depth, no land visible, and little ice with much rain.

This modification of climate in so northern a latitude is doubtless due to the same cause, the proximity of a great sea, as in the well-known example of the long and narrow Siberian promontory of Taimyr, explored by our former medallist Middendorff, and to which I formerly invited your attention.† In other words, it is caused by the pre-

* My eminent geological friend, Leopold von Buch, first made known to the German public, in 1846, the importance of M. Keilhau's observations in Bear Island, and deduced therefrom some important generalizations ('*Trans. Berlin Acad. of Sciences*'). A translation of his memoir, by Professor J. Nicol, is given in the '*Journal of the Geological Society of London*,' vol. iii., *Translations and Notices*, p. 48.

† See *Journ. R. Geogr. Society*, vol. xv., *President's Address*, p. cii.

dominance of water over land; the former tempering cold, the latter when in great masses producing it. It is then by the application of this distribution of heat and cold, which resulted in the establishment of the isothermal lines of the great philosophic geographer Humboldt, as well as by attention to the fact of the vast icy masses of the North Siberian shores being held together to the land during the winter, that Mr. Petermann* has made the novel suggestion, that a winter, or rather an early spring, search should be attempted through a belt of water which is too broad to be affected by congelation; and that this effort should be carried out at a time when this sea is not rendered impassable (as it is in summer) by floating fields of ice proceeding from the Siberian shores. As an instructive map to explain this author's views has been prepared, and the project is under the consideration of the authorities, it is just possible, that before our next anniversary we may hear of a steam voyage towards the North Pole and back, which may have penetrated beyond Parry's farthest north, and which shall have been executed in the ensuing winter and spring! Why might not the strong little screw-vessel, the 'Isabel,' and a consort, if placed under a vigorous commander, effect such an object? or why, some sanguine persons would say, might not such an expedition even get through the Great Polar Sea, and emerge from it by Behring Strait? For, whilst much caution is required in forming an opinion on this subject, and whilst I refer you to the former partial efforts of Buchan and Franklin, as described by Beechey in 1818, and also to the fact that whalers do not resort much to that great opening, it must be recollected that the proposal of Mr. Petermann is original and untried; all our previous expeditions having been made in the summer.†

In quitting the consideration of these exciting topics, which have much occupied your attention during a large portion of the session, let me remind you that, if we are now well assured that no practicable north-west passage, as suggested by Cook and contended for by Barrow, can be detected, it is still a satisfactory reflection, that in the pursuit of an object which the last discoveries have *almost* set at rest, our countrymen have maintained pre-eminence in nautical researches, and that, in spite of great natural obstacles, they have de-

* Since the Address was read, Mr. Petermann has embodied his views on various Arctic topics in one pamphlet, entitled, 'The Search for Franklin,' with the polar chart above alluded to, &c.

† Sir G. Back, who was in the expedition of Buchan and Franklin, to the north of Spitzbergen, seems to think, however, that, to say nothing of darkness, the temperature would be too low in winter to admit working with ropes among the ice.

lineated a very great amount of the earth's outline which was entirely unknown to our fathers. In comparing a correct map of the world constructed at the conclusion of the last war with one which exhibits the present state of our knowledge, we at once see the immense debt of gratitude which is due to our countrymen who have won these geographical trophies during the long peace of this century.

AUSTRALIA.

Australian Geography.—My old friend Sir Thomas Mitchell has presented to the Society a general map of the colony of New South Wales, compiled by himself and engraved at Sydney; and in calling your attention to this valuable document, I have also pleasure in seeing that additions are continually making to the more portable maps of these colonies by Arrowsmith and Wyld.

The south-western portion of this great continent has received much useful map illustration, through the labours of the Surveyor-General of Western Australia Mr. J. Roe, and of Mr. Augustus Gregory.

The general reader has been enlivened by sparkling sketches of the manners and habits of the colonists and natives, as recently published in the 'Antipodes' of Colonel Mundy, who makes the life of an accomplished soldier in Australia or New Zealand familiar to every one.

An instructive statistical work on Australia has been published by Mr. Melville, during many years a resident in different parts of that great country.

Though less read by the public, the work of Mr. Macgillivray, the naturalist of the expedition under our laureated associate the late Captain Owen Stanley, is one of deep interest to the ethnologist, and bids us hope for excellent results on the return of the expedition recently detached to the South Pacific under Captain Denham, and to which our member Mr. Macgillivray is appointed.

This author has shown that, whilst the Australians are nearly in the lowest possible grade of human existence, they have languages more complex than any of modern Europe; these can only have been developed in a long succession of ages. His sketches of the distinctive characters of the different peoples which the expedition visited, whether Malays, Papuans, or Australians, are drawn with simplicity, truthfulness, and power.

Gold Produce of Australia.—When I first occupied this chair in 1844, and announced to you a then forthcoming work of my distinguished friend Count Strzelecki, whose collections of rocks, fossils, and whose detailed maps I had examined, I drew your attention to

the remarkable coincidence between the structure of the great eastern chain of Australia, which I termed the "Cordillera" of that continent, and that of the auriferous Ural mountains, from which I had recently returned, remarking that "*as yet* no gold had been discovered in our Australian colonies." That comparison produced, it appears, however, some fruits; for, in the year 1846, small specimens of gold in quartz rock having been sent from New South Wales, as resulting from what I had written, I at once urged the unemployed Cornish miners, who were about to emigrate, to prefer that colony, and there seek for gold in the debris of the older rocks of that region. This exhortation, which was printed in the Penzance newspapers, October, 1846, and also in the 'Transactions of the Royal Geological Society of Cornwall,' caused, I was told, a sensation in Sydney, and set other individuals to search after the precious metal; and in 1848 I received letters, dated 1847, from persons in Sydney and Adelaide quite unknown to me, who stated that they had detected gold, and that they knew where they could find much more, provided the Government would modify the mining laws, and render it worth the while of speculators really to open out mines.

Indeed, Colonel Helmersen, my associate in the Academy of St. Petersburg, writing to me in 1846, and unaware of what I had previously printed in 1844, also compared the Australian rocks with those of the Ural. He farther urged me to draw the attention of the Government of New South Wales to the probability of finding gold in the alluvia of that country; but although I then expressed my opinion very decisively in Cornwall and elsewhere, I did not feel myself entitled to address the Government until 1848, when I explained my views to Earl Grey,* then Minister of the Colonies, informing him of fresh confirmations of them from Victoria Land as well as Sydney, and referring him back to the comparison of 1844, and to the anticipation of quantities of gold-ore in 1846—both of which publications, I need not remind you, were anterior to the discovery of the Californian gold (1847). Such printed documents, followed by an official letter of November, 1848, which is registered in the Colonial Office, prove, I apprehend, that your President was the person who, by inductive reasoning, and a comparison of the rocks of two very distant countries, anticipated the production of the Australian gold; and I here record the

* Earl Grey did not take any steps in this matter, because, as his Lordship has since informed me, he feared that the discovery of gold would be very embarrassing to a wool-growing colony. Colonel Helmersen has not printed anything on the Australian gold; but I introduced his name into my Cornish letter to Sir G. Lewis, and hence it became known in the Australian colonies.

fact, because the view would never have been promulgated had you not, gentlemen, honoured me with this chair, and thus incited me to do my duty, and show the usefulness of our science, by comparing two distant meridian chains of the earth, one of which belonged to our own country.

I must here, however, do justice to my friend and associate in the Geological Society, the Rev. W. B. Clarke, who, for a long time resident in the colony of New South Wales, played a prominent part in the discovery of the gold some years before profitable works were opened by Mr. Hargraves in 1851. Mr. Clarke states, that as early as 1841 he expressed his opinion to persons there, to whom he refers, that the colony would prove to be a 'gold country.' Believing in the accuracy of his declaration, I must be permitted to say, that as no one in England was made acquainted with his views, and as the first *printed* document which bears his name is dated in 1847, he will doubtless admit that the published comparative and inductive reasonings of 1844-6, by which the anticipation was arrived at *here*, were wholly irrespective of his local and unpublished conversations. In truth, no geologist who returned from Australia before the year 1847 had ever adverted to the occurrence of gold ore in these colonies.

For my own part, however, I would in no way derogate from the independent merit of Mr. Clarke, and I trust that in the colony on whose geological structure he has thrown much light, and in which he is now exploring the extension of the gold ore, he may long enjoy the credit to which he is justly entitled, for having there roused attention to the phenomenon.

The extent to which gold has been worked in our Australian colonies is to be seen generally in a compendious map, inserted in a small work on the general distribution of gold over the world, by our associate, Mr. Wyld, chiefly taken from the instructive work of M. Adolf Erman; and when new and more detailed maps are produced, which are in preparation by Mr. Arrowsmith, it will be seen how this golden flood is distributed at intervals, and, just as I expected, on the flanks of the main watershed, or backbone, of that continent, which, trending from north to south, bends off the west to pass to the north of Melbourne, where one of the richest accumulations has recently been detected at Mount Alexander.

It is unnecessary here to recapitulate data on which I have been dwelling for some years past: the chief inference from such facts was, that as auriferous veins and masses usually deteriorate downwards in the parent rock, and that their richest parts have been superficial, the most prolific goldfields are necessarily composed of that debris or

drift which has been abstracted by former great operations of nature from the surfaces of the mountains, and distributed in heaps of gravel, mud and sand, upon their sides or in the adjacent valleys.

I have also endeavoured to show, that as gold has never been found in a notable quantity, except along the slopes of the more ancient backbones or axes of continents, and has never been derived in any quantity from secondary or tertiary strata, so the goldfields of nature are restricted to such comparatively narrow zones. When, however, we look to the vast length of the "Cordillera" of Australia, and of other ridges which may be found to be similarly constituted in that continent; and, above all, when we reflect, that no other large region of the earth has been so unoccupied by human beings acquainted with the value of the metal, it behoves us to be prepared for a considerable (though temporary) augmentation of it.

Eight years have elapsed since I spoke to you, in a former address, of the social and political effects which might be produced by new large supplies of gold, such as of Siberia, and to which I called the notice of British statesmen. But although, in the intervening years, California and Australia have let loose floods of gold, the very apprehension of which would formerly have alarmed most statist, we have yet to learn that any sensible diminution of the value of our standard metal has taken place.

Whilst as a geologist I have affirmed, from reference to experience and physical data, that, large as the supply may now be from the opening out of two great auriferous tracts previously unknown (because the regions were untrodden by civilized beings), such supplies as come from California and Australia will prove exhaustible because *superficial*, just as was the case in those parts of the old world, which in their day had rich auriferous deposits. I may, indeed, now announce to you that, as far as can be ascertained, the supplies are already diminishing from two of the great sources—Siberia having given considerably less than in previous years, whilst California, the produce of which had been run up to a very large amount through the indomitable energy of the Anglo-Saxon race, is likely to fall short (if I am not misinformed) this year by some millions sterling.

Though incompetent to speak of the political, social, and statistical effects of the remarkable golden shower of this century, I may put you in possession of words which proceeded from a master-mind, now no more. In a letter addressed to myself in March, 1850, the late Sir Robert Peel, after alluding to an evening discourse I had delivered at the Royal Institution, thus proceeded:—"On the 6th of

May, 1844, in bringing in the Bank Charter, I adverted to the rapid increase of the annual supply of gold from mines within the dominions of the Emperor of Russia, and recommended those who wished for a relaxation of the standard of value in order to benefit the debtor, well to consider whether their objects might not be effected by natural causes—the decreasing relative value of gold in consequence of more abundant supply, without the aid of legislative intervention. Your arguments," he added, "are powerful to show that there is no probability (risk I should say) of precipitate and violent disturbance. *It takes a long time, and a great disproportion in the amount of supply, to affect the relative value, throughout the world, of two such articles as gold and silver.* The united influence of Siberia and California will, however, I think, justify my inference of 1844, that there is a tendency towards diminished value on the part of gold. An extraordinary increase in the supply of both gold and silver might concurrently take place, not affecting their relative value between each other, but affecting the price of all other commodities estimated with reference to the precious metals, and the interests of debtor and creditor."

The truth of the sentiment which is italicized has been fully borne out by the events which have followed since the great statesman was taken from us. Those events have also concurred in showing the improbability of any precipitate or violent disturbance being produced by the new discoveries.

BRITISH WORKS.

Intending to treat of what has been called "our own labours," by alluding to the memoirs read before us in conjunction with general observations on the quarter of the globe to which they pertain, let me first say a few words on works, either looked for or completed, which specially concern my countrymen.

Tides.—Physical geographers have drawn various curve lines on the surface of the globe, representing the distribution of temperature, of seas and winds, of nations and languages, vegetation, animal life, &c. &c.; which lines have been recognized as presenting, in a compendious and striking form, the result of great masses of the labour of travellers and observers. Lines thus exhibiting the result of many observations belong to the aqueous as well as to the dry portions of the globe. The cotidal lines, for instance, which mark the form of the large waves proceeding from the great oceanic current, which constitutes the tide that is twice a day carried to every shore, are a

subject of inquiry which may well interest the geographer no less than the astronomer. The form of these cotidal lines has been the object of various researches, from Dr. Whewell's 'Essay towards a First Approximation,' in 1833, to Admiral Lütke's 'Notice sur les Marées Périodiques dans le Grand Océan Boréal et dans la Mer Glaciale,' in 1839.* But notwithstanding these admirable efforts, together with the Memoirs of Sir J. Lubbock, and the practical observations of Mr. Bunt, &c.,[†] our data on this matter are very incomplete, and the cotidal lines in the great ocean spaces very doubtful in their form, as the author of the 'First Approximation' himself proclaimed.

The British Association for the Advancement of Science has, therefore, most appropriately urged upon the Government the importance, for scientific ends, of an expedition of a surveying ship being sent out "ad hoc" to pursue the construction of a map of the tides and oceanic currents as its sole object. Such an expedition could not fail, in a year or two, to supply in a great measure what is thus wanting to hydrography; being, among other recommendations, a scientific exploration of a new and yet obvious kind, in which it is to be hoped England will take the lead; for the expense will be very trifling in comparison with the scientific honour and value, if not the uses, which we shall derive from it.

New Works.—Mr. Alexander Keith Johnston, who has already done much to introduce the study of physical geography into this country, has recently published two Atlases of General and Physical Geography for the use of schools, which are novel among us as to their execution; being printed in colours after the method employed on the continent for geological coloured maps, and rendered more simple by improvements introduced into that process. The Atlas of General Geography is preceded by a most useful table of every place to be found on the maps, with an easy indication for finding them, and with their latitudes and longitudes to the nearest minute—a degree of accuracy sufficient for every purpose of geography and history. The School Atlas of Physical Geography is a reduction of his larger works with the more recent discoveries, and must form a valuable accompaniment to the treatise on Physical Geography by our talented countrywoman Mrs. Somerville. These works are to be followed by Atlases of Classical and Scripture Geography on the same plan, the whole forming a most valuable addition to the imperfect means hitherto possessed by the teacher for imparting to our younger fellow-countrymen a good know-

* Phil. Trans. 1833, p. 147, also 1835 to 1836; and Rep. Brit. Ass., 1838 2-41.

ledge of geography, the study of which has been hitherto too much neglected in our public schools.

Mr. Petermann has presented to us a series of elementary physical maps, now sixteen in number, the first of which, on the chief botanic regions of the world, was announced last year, the latest being on 'Ocean Currents and River Systems.' The same indefatigable author constructed and published, you will recollect, the geographical view of the origin of the articles in the Great Exhibition of 1851, and has also prepared (in conjunction with another of our members, the Rev. S. Clark) maps illustrative of the Ecclesiastical Geography of the British Empire, from the fourth century to the present time.

Mr. Findlay has completed his 'Directory of the Great South Sea,' a work likely to prove very important to navigators. It is divided into two large sized volumes, in which authorities from all countries have been collected, and the introduction contains a condensed historical notice of all the principal Pacific navigators. This useful work is accompanied by a chart, consisting of twelve sheets of double elephant paper, including the whole ocean from the shores of America to those of Africa, and forms a complete view of the Indian and Pacific Oceans.

The Society has received as a donation coloured plans on a scale of 24 inches to the mile of town surveys, which have been prepared as specimens by the Board of Health. They are good examples of the minute accuracy with which her Majesty's military surveyors can execute their work, whilst the clear and methodical arrangement applied to it by Mr. Chadwick and his assistants gives us every reason to believe that the nation may expect the most salutary results from their labours. The accompanying minutes of information respecting the drainage of towns, roads, and suburban lands are highly instructive.

The Gazetteers now in progress of publication, respectively entitled Knight's 'Imperial Cyclopædia,' Blackie's 'Imperial Gazetteer,' and Fullarton's 'Gazetteer of the World,' are, each of them, cheering examples of the increasing demand for geographical instruction, and far exceed, in copious description and pictorial illustrations, any works of this class previously published in our country.

If my predecessor spoke in terms of commendation last year of the efforts of our associate Mr. Wyld to popularize geography by the construction of his great model of the earth, I am bound to record the expression of my belief, that this effort has been very successful, both by instructing the lower and middle classes, and by inducing many of the higher classes to attach to our science the importance it deserves.

Having heard from many who went to Leicester-square to scoff, that they came away with increase of knowledge and a desire to renew their visit, I doubt not that this model of the earth has been one of the best popular auxiliaries we could have been provided with, for the increase of the numbers of this Society.

Dr. Smith, who has rendered great service to classical studies, has followed up the publication of his *Classical Dictionaries* by one of *Ancient Geography*; the two first numbers of which, embracing the letter A, have just appeared.

A very useful '*Manual of Geography*,' the joint production of Professors O'Brien and Ansted, Col. Jackson, and the Rev. C. G. Nicolay, has also been presented to the Library by the publisher, Mr. Parker.

Meteorology.—It is pleasing to learn that a Meteorological Society has been formed last summer at the Mauritius under the auspices of the Government, which, from the names of its councillors, and the very good regulations which it has issued, promises to obtain much novel information from that colony and the surrounding ocean.

Many are the facts which still remain to be recorded before the laws of atmospheric phenomena can be established; but the success which attended the labours of Sir W. Reid, in proving the gyration of great storms, is an encouragement to geographers to call for fresh data.

Professor Oldham, in writing to me from Churra Poonjee, in the Khassya Hills, north of Calcutta, states that the rainfall is there about 600 inches, or $8\frac{1}{2}$ fathoms, per annum; 550 inches of which descend in the six rainy months commencing in May; and that in one day he measured a fall of 25·5 inches! This remarkable phenomenon was, it appears, previously well known to Drs. Hooker, Thomson, and other scientific men; but as the facts were only recorded in local periodicals, it is well to give them as great a publicity in England as they have obtained in Bengal.

Our Society has received from Mr. Hugh Thurburn, through an Associate, Captain the Hon. Henry Murray, R.N., the communication of a meteorological journal kept by him at Alexandria during three years (1847-8-9). The instruments used and their positions are described, and the observations apparently made and noted with great care. This journal contains data from which a very complete account of the climate of the locality might be derived; data which to this time were so deficient, that even in respect of temperature, in the well-known and elaborate tables of Professor Dove, the mean monthly temperature of Alexandria was obtained only from eight

months' observations. The annual amount of rain at Alexandria stands in contrast to that, which I have just mentioned as occurring in places in India, the quantity at the former being only $7\frac{1}{2}$ inches. This quantity, indeed, might be expected to be small, from our knowledge of the fact that three or four degrees to the south the country is nearly rainless.

In a paper lately read before this Society, by Captain William Allen of the Royal Navy, giving an account of observations taken by him with the aneroid in Syria and Palestine, the author expresses an opinion rather more favourable to this little instrument than has been generally entertained, acknowledging however, at the same time, that it is liable to errors; among which he enumerates "the want of a standard-point, alteration in the elasticity of the spring, the expansion or contraction of the lever," &c.

Let me add the expression of my wish (and an example will shortly be given from Zanzibar by Colonel Sykes) that by means of well-conducted meteorological observations, made in those parts of Africa where Europeans are resident, aided by such casual information as is obtained by the explorations of travellers into its interior and unknown districts, we shall be enabled, at no very distant time, to account for the exceptional and apparently anomalous physical conditions of this vast continent.

Ordnance Survey of Scotland.—In referring you to the Report of a Committee of the House of Commons, appointed last Session to inquire into the state of the Ordnance Survey of Scotland,* I am happy to state that the more active measures for the construction of a general map of that country, which I have been urging for eighteen years, have at length been adopted. The publication of maps on a six-inch scale, which had been carried out for the whole of Ireland at a great expense, had been already applied to two southern counties of Scotland, with the addition of "contour" lines, when it was ascertained that with such a process, and at the then rate of outlay, *more than half a century would elapse* before North Britain could have any map!

The British Association, at my instigation, first roused attention to this subject in 1834, and so effectually revived it in 1850, that the above-mentioned Committee of the House of Commons was at length appointed. Their Report has happily procured a grant of £25,000*l.* per annum for the Scottish Survey, accompanied by a strong and distinct recommendation that this sum *should be exclusively devoted to the com-*

* See also Mr. Keith Johnston's instructive 'Historical Notice of the Progress of the Ordnance Survey in Scotland,' and an excellent article on the whole subject in the 'Edinburgh Review' for January, 1852, p. 179.

pletion of a real map, on the scale of one inch to the mile. If this suggestion were complied with, and the publication of the six-inch survey suspended until the general map was finished, though the country be really surveyed on that scale, all Scotland would be usefully mapped in ten years. In the Report of the Committee of the House of Commons—for which we are specially indebted to its intelligent chairman, the Hon. Francis Charteris—you will see how the opinions of the eminent civil engineers, Stephenson, Brunel, and Locke, agree with those of the members of the Committee, in the earnest recommendation of the speedy publication of a map upon a one-inch scale for general purposes.

In fact, the Committee could not avoid being strongly impressed with the declaration of a previous Parliamentary Committee appointed to inquire into the state of geography in Ireland, who reported that, after an expenditure of 850,000*l.*, and the publication of a complete six-inch survey, the sister country was still without a map. The six-inch survey is, in truth, much too cumbrous for consultation in county matters; and though there are certain tracts of mining-ground where it is unquestionably of value, it is too small for many detailed purposes of the engineer and farmer, for most of which a double or even a treble scale is required.

Rejoicing, as I did, in the decision of the House of Commons in reference to Scotland, and also in learning that a sufficient sum had been granted to complete the map of all Scotland on the scale of one inch, in the space of ten years, I have recently been grieved to hear that local petitions from the south of Scotland have been got up to procure a publication of the six-inch survey. I have been told that some of the persons so petitioning are acting under the belief that each proprietor will thus obtain a plan of his estate. But even if it were so (the scale, however, is much too small for plans of property,) what sort of patriotism is it, I ask, which, for such considerations, should sacrifice the interests of Scotland at large, and possibly postpone for a long period the issue of any real map of the whole country? Let the Highlanders and their chiefs unite as one man against this injustice to their region, which of all others in North Britain will most signally develop the beauties of topography on a good and useful general scale!

Guano.—On few subjects have the commercial and agricultural public been more incited to study distant and almost unknown specks on the face of the globe, than in the search after the deposit of birds, so useful as a manure. The Peruvians, possessing the Chíncha Islands, where it

abounds, held almost a monopoly of this article, until our speculators, reading of the Isle of Ichaboe, off the south coast of Africa, brought from it supplies which for a time lowered the price one-half. But Ichaboe being almost exhausted, and the monopoly prices having been resumed, spurious imitations of the real substance have been largely palmed upon the public. It is therefore important to know that the Islands of Lobos de Afuera (lat. $6^{\circ} 56' 45''$ S., long. $80^{\circ} 43' 55''$ W.) and Lobos de Tierra (lat. $6^{\circ} 26' 45''$ S., long. $80^{\circ} 52' 50''$ W.), off the coast of Peru, contain at this day as much guano as when they were described by the American navigator Morrell. Politics do not enter into our domain, and we must refer to statesmen the question agitated by Captain Wentworth Buller on the one hand and by Mr. Peacock on the other, as to the ownership of these islands. But, whether Peru possesses really the rights of sovereignty or not, let us hope that effectual measures may be forthwith adopted for facilitating the exportation of this valuable substance to the shores of other countries.

LABOURS ON THE CONTINENT OF EUROPE.

Russia.—The Imperial Geographical Society of St. Petersburg, which was founded in the year 1845, on a plan similar to our own, as I formerly announced to you, has, under the liberal endowment of the Emperor, and under the Presidency of our Honorary Member the Grand Duke Constantine, undertaken the execution of a range of duties and publications much beyond that to which we can pretend, unassisted as we are by our Government. One of the great objects in the formation of this Imperial body being to diffuse statistical as well as geographical knowledge through a vast empire, the mass of whose inhabitants are unacquainted with any foreign tongue, it became essential that the Transactions should be printed in the Russian language. Hence it is, that even now, when we have obtained its publications, they are sealed books to the great majority of readers, and call therefore for that brief explanation which I have been enabled to obtain of them. Seeing before me the important list of works which is about to be enumerated, I cannot forbear to express a hope, that a translation of the most original of the Russian discoveries should be simultaneously published by a Society which contains many highly educated men, fully competent to execute the gratifying task of diffusing an acquaintance with the geography of their country through Western Europe and the rest of the world. Besides defraying the cost of expeditions, the Russian Society publishes five classes of memoirs:—1. Its own Transactions (*Zapiski Russkogo Geograficheskogo*

Obchestvo); 2. Geographical News (*Geograficheskie Izvestia*); 3. Compendium of Russian Statistics (*Sbornik Statisticheskikh Svedeniy Rossiya*); 4. Pocketbook for the Friends of Geography (*Karmanaya Knizha dlia lyubiteley Geografii*); 5. Almanac of the Society (*Vestnik Imperatorskogo Russkogo Geograficheskogo Obchestva*). To these there has very recently been added an octavo volume of a 'Bulletin.' The first and second volumes of the 'Transactions, in addition to an opening Series by the great astronomer Struve, contain memoirs on descriptive geography; such as On the Mangishlak Peninsula, by Colonel Ivanin, with a Map; On the North-west Coast of America, by Lieutenant Zagoskin; On the best Means of Reaching the North Pole, by Admiral Wrangel; On the present State of Geodetical and Topographical Research, by General Bolotoff; and On the Possessions of the Hudson's Bay Company, by the Academician Savich;—Ethnographical Treatises by our foreign member Bäer, and also by Khanikof, Nadejin, Bodey, and Chegren, relating to Russia, including Livonia and Courland, the interior Kirghis, the Turkoman tribes (Yamud and Goklan), &c.;—Historical and Statistical Account of the Russian Coinage, by Arsenief; On Russian Statistics, by Zablotsky; and On Climatology, by Poroshin.

The third volume contains, amongst other subjects, the Exploration of the Upper Valleys of the Amu and Sir Daria (Oxus and Jaxartes), including the table-land of Pamir, with a Map, by my able and lively friend M. Plato Telihatchef; 'The Merits of Peter the Great in diffusing and promoting Geographical Knowledge in Russia,' by the Academician Bäer, which, followed by a second part in the next volume, is, I am assured, an excellent memoir, and I hope it may be translated into English. There is also an Outline Sketch, with the best existing Map, of the Kokon Khannat (Northern Tibet and Bolar), by the Topographical Staff, under the auspices of Prince Gorchakof, the Governor-General of Western Siberia.

The fourth volume contains Surveys of the Caspian, by Colonel Blarenberg; and a Memoir on the Commercial Routes of China, by Paladiy Kafarof, the learned Bishop of the Russian Mission at Peking.

In the fifth volume we have the account of the last Geographical Explorations of the North Ural, by Hofmann, Strajevsky, and Kovalsky; a rough Survey of the Coasts of the Aral, by Captain Makshef; an Outline of the Khannat of Khiva, by Colonel Danilevsky; Sketches of the Wild Rock of the Kirghis, by Prince Gorchakof; an Illustration of the Map of the Aral Sea, by Khanikof; and a Review of the Trigonometrical Labours in Russia, by Captain Maksimof.

In this bare enumeration of the chief memoirs in the Transactions of our contemporaries you will recognise the efforts of astronomers, ethnographers, statista, and botanists, to unite with pure geographers in accumulating data, which illustrate distant portions of their vast empire, or of its neighbouring states. The publication entitled '*Geographical News*' is a praiseworthy endeavour of its compilers, Professors Nadejin and Gregorief, to diffuse an acquaintance with the geographical science of Europe and the rest of the world among the upper and middle classes of Russians. The Compendium of Russian Statistics, of which a first volume only appeared in 1851, promises to be very valuable, if continued with care and perseverance. It embodies Memoirs of Professors Vesselofsky, Käppen, Zablotsky, and M. Milutin, and one by the Vice-President of the Society, M. Michel Muravief, the chief of the Civil Engineering Department, to whom we are indebted for several communications relating to our own projects of explorations towards the North Pole, and in Arabia. Our sister society of British Statists will no doubt cull from this volume some important data as to the state and progress of population of a large region hitherto so ill known in Europe; whilst many persons will be deeply interested in an admirable review of the productions of the mines of Russia, by my eminent friend Lieutenant-General Tcheffkine (to whose assistance I was so signally indebted during my Survey of Russia), and by Colonel Ozersky, an able officer of mines, who has translated the work of my colleagues De Verneuil, Keyserling, and myself, into the Russian language.

The '*Geographical Keepsake*,' like the '*News*,' is intended to instruct and to arouse a curiosity for research; and though one volume only has appeared, it comprises, besides miscellanies, able Memoirs of Professor Kanitz, of Dörpat, On the Progress of Geographical Knowledge from the beginning of the Eighteenth Century; of the Academician Lentz, On Heat in reference to Climatology; of Bäer, On the Influence of External Nature on the Social Relations of different Nations, and on the History of Mankind; and of Savelief, the Orientalist, On Central Asia.

The Geographical Almanac, which is little more than an appendix to the regular Transactions, and might have been included in it, contains, however, two interesting Memoirs,—the one by M. Streznevsky, On the Geographical Materials of the Russian Language; the other by M. Khanikof, one of the Secretaries of the Society, On an Excursion to Tachkand, in Central Asia, by MM. Pospelof and Burnachef, in 1860.

The *Compte Rendu* of the works of the Imperial Society in 1850, being in the French language, will have made you acquainted with some of the results of the labours of our contemporaries, particularly through the medium of its accompanying instructive general Map, on which many new data are indicated.

Besides these productions of the Russian Geographical Society, we have received pamphlets, one of which, of considerable value to the practical geographer, is the Register, by Khanikof and Tolstoi, of various positions in North-western Asia, astronomically determined. Again, to condense and register the materials accumulated in the preceding years respecting the countries lying between the Bolor, the Caucasus, the Hindoo Kush, the Atlas, and the Ural, General Bolotof and M. de Khanikof undertook laborious comparative estimates, which, with many lists of astronomical determinations, they have published in separate pamphlets. M. de Khanikof writes to me, in terms of great regret, that he has not yet had time to bring out the interesting journal of the Italian Envoy, Florio Beneveni, on a voyage which he made in 1721-25 from Astrachan, by Mesched, to Bouhkara and Chiva. In the mean time he has published useful analytical criticisms on Maps of the Khanat of Chiva and the Aral Sea, and accounts of journeys in those regions of Asia and its Steppes, of which we have previously had the best general descriptions from our foreign member Colonel Helmersen.

Whilst speaking of that region it must be noted, that Capt. Bootakof, an accomplished officer of the Imperial navy, laboured hard and successfully during two consecutive years, and under great difficulties—first in the construction of two small vessels, next in the difficult exploration of the inhospitable Sea of Aral—in determining by astronomical observations the true outlines of its coasts, and in sounding its depths. Though the knowledge thus acquired has not yet been published, let us hope that the same munificent conduct which has led the Imperial Government to diffuse among other nations a perfect acquaintance with the features of the coasts of the Empire, will operate, and thus make known all the physical phenomena pertaining to this inland mass of water, which, forming part of the grand Aralo-Casplan depression in the earth's surface, is singularly interesting to geographers and geologists.*

Having offered many encouraging examples of the good which may be effected by the Russian Geographical Society, I live in the

* See 'Russia in Europe, and the Ural Mountains (Aralo-Casplan)', vol. i. p. 299.

belief that the accomplished Prince who presides over it will, with the knowledge he possesses of what is still wanting in the vastest empire in the world, add lustre to his name by eliciting many further researches of equal interest. Great light, for example, may be still thrown on the interior of Northern and Central Asia by the publication of even those general outlines of the physical features of those regions which the Imperial Government possesses. In the mean time, I rejoice to hear, that the Emperor has authorised an accurate and real survey of the southern portion of the Ural Mountains; and before another anniversary I hope to be in possession of documents which will show you that along her western frontier Russia will have gone far to complete the greatest geographical work in the world, in M. Struve's admeasurement of an arc of the meridian extending over twenty-five degrees of latitude! Such works are worthy of the Russian Emperor who, by energetically condensing many conflicting laws, enabled his subjects to obtain justice, and who by his firmness and moderation has sustained that general peace of Europe, without which science, and, above all, geographical research, cannot flourish.

Sweden and Norway.—As few royal personages devote much time and labour to the actual work of the geographer, I have particular pleasure in recalling your attention to the highly-useful hypsographical, mining, and arboreal maps of Sweden, prepared by the hands of our honorary member, the Crown Prince of these kingdoms, which were exhibited to us by Count Rosen, who further explained, that, besides these, his Royal Highness had also constructed a set of maps, showing the judicial, ecclesiastical, and civil organization of the country. When united with a map of the Swedish population, prepared by Colonel Löven, it will thus be seen that all the elements of a great statistical national work are obtained. Our associate and honorary member, General Akrell, director of the Swedish Topographical Corps, has announced a new edition of the military and statistical map of Sweden; and also six new sheets of the chorographical Atlas of the kingdom, intended as a substitute for the work of Hermelin, a proof copy of which has been forwarded to us. The large Topographical Survey extending over 8700 geographical miles, as mentioned in the last Address, is not yet terminated, and a reduction of it only will be published. The Swedish triangulation is united, in the Åland isles of the Bothnian Gulf, with that of Russia, and, passing across the Sound, with that of Denmark, being there connected with the triangulation of the continent of Europe; so that the trigonometrical observations made at Christiania, Stockholm, Pulkova, Berlin, and Altona, are now in harmony.

The trigonometrical surveys and levellings from Torneo to Alten, in the North Sea, are in full operation, and when finished will not only give the relative heights of the Gulf of Bothnia and the North Ocean, but will also serve as fixed data from whence to calculate the greater or less irregularity of the rise or depression of the Scandinavian lands. General Akrell also acquaints us that the excellent Maritime Atlas of Admiral Klint, consisting of 98 general and 35 special Maps, which were all published at the private expense of the late gallant officer, have been purchased by the Government, and are continued by direction of the Swedish Admiralty; and that Professor Than has published his fourth volume of a description of Sweden.

Our honoured associate Hansteen, in writing from Christiania, informs us that the great Survey, to which I have alluded as being conducted under the general direction of the great Russian astronomer Struve, will soon be brought to a termination, as respecting Swedish and Norwegian Lapland, through the labours of Lieutenant Klouman of Norway, Professor Selander, and Dr. Lindhagen of Sweden, in spite of the many obstacles to observation presented by the rigour of the climate, and the immense fields of ice at certain heights above the sea.

The Survey of the so called long "sea-bridge" (Havbroe), which was supposed to range along the coast of Norway, is finished, and shows that the Jutland bank stretches west and north to about 61° , but is separated from the Norwegian bank by a channel nearly 200 fathoms deep; that the fishing grounds between Stat and Christiansund are not so distant from the coast as was supposed, and are completely separated from the Jutland bank; and hence the tradition of the existence of a continuous submarine bridge between the coast of Norway and the Continent is a fable. These banks prove to be, in fact, as every geologist would *à priori* suppose, the representations, under the sea, of the detached "Osar" of the Swedes and the Skjergaarden of the Norwegians, as seen in the water-worn gravel ridges of the present continent of Scandinavia.

Denmark.—Whilst our honorary associate, Admiral Zahrtmann, has presented to us the third volume of the Expedition round the World, undertaken, under the direction of the late King, by the Danish frigate 'Galatea,' commanded by Captain Steen Bille, I must particularly call your attention to the labours of a kindred Society, which has arisen under the special auspices of the late and present sovereigns of Denmark.

The Royal Society of Northern Antiquaries has most successfully
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rescued from oblivion memorials of the highest interest to every archaeologist, and data to which historical geographers attach great value;* and we have now been appealed to by that Society to participate in labours, which they have generously extended to our own islands. They recently sent two of their associates, Professor Munch and Mr. Worsaae, amongst us to explore our North British and Irish antiquities; and as a result, the Northern Society now announces a new and critical edition of the Sagas, relating to the former inhabitants of the Orkneys. As the Earl of Ellesmere, one of our members, distinguished for the union in his own person of literature with geography, has translated the Preface to this work, and explained its contents, I hope that others will join with me in following his Lordship's example, and become members of a Society, which is occupied in throwing light on the history of the common forefathers of Scandinavia and the British Isles. This modern union will form a "sea-bridge" between two countries, united by many ties and sympathies, as binding as any treaty; and it is gratifying to observe that our Vice-Patron, Prince Albert, has already assisted in its formation by inserting his own name in the list of founders.

Prussia and adjacent parts of Germany.—The genius of Humboldt continues to enlighten mankind from the terrace of Sans Souci. A new volume of the 'Kosmos' has appeared; but as it pertains to the higher walks of astronomy, I must wait for the concluding volume, which will return to things terrestrial, before I venture to take a view, however imperfect, of the results of this remarkable effort of the veteran philosopher, to whom our age owes its greatest advances in philosophical geography.

Our eminent medallist Ritter has printed his second part of the Geography of Palestine, which will be completed in a third volume. Professor Berghaus has published a third part of his 'Geographical Annals' (or *Geographische Jahrbücher*), and a second edition of his great Physical Atlas. The last-mentioned work is justly considered in Germany as the graphic illustration of the 'Kosmos' of Humboldt, and in this country we have been made acquainted with its great value through the labours of Mr. Keith Johnston and Mr. Petermann.

M. Adolf Erman, our gifted correspondent, has produced an Essay on the Temperature of Springs, with other works, among which is an able sketch of the geographical advantages derivable from such an exploration of north-eastern Asia as that recently proposed by

* Among their geographical works see "*Aperçu de l'Ancienne Géographie des Régions Arctiques*," 1847 (with maps). Ratz's labours are most valuable.

Lieut. Pim. I cannot allude to that region, and to M. Adolf Erman, without expressing my earnest hope, that the concluding volumes of this energetic traveller, which treat of Kamschatka, may, like the first volume, be soon translated into English; for, unquestionably, it is one of the most valuable, original, and instructive geographical works of modern times.

In map-making M. Fromme has produced a new physical atlas, and the Prussian Government has added ten new sheets to its surveys (none of which, I regret to find, have been presented to us). Dr. Keipert, of Weimar, having published a new map of Hungary, is preparing two large maps of Central Asia and Turkey; and M. Ravenstein, of Frankfurt, has brought out an original map of the country around that city. My old friend, that sound geologist and miner, M. Henri von Dechen, has just published an elaborate octavo volume, in which are enumerated the altitudes of several thousand localities in the Rhenish province of Prussia.*

Bavaria.—Whilst a sixtieth part only of Scotland has been mapped, and a large portion of the northern counties of England are yet unsurveyed, Bavaria has almost completed her beautiful topographical map, consisting of 113 sheets, on a scale of 1·28 inch to the mile, of all her territories to the east of the Rhine, under the superintendence of General von der Mark, the successor of General von Bauer. Of this great national atlas, eight sheets of the country on this side of the Rhine only are unpublished, and even during the past year several portions of the Palatinate have been completed. A general atlas of Bavaria, in 15 sheets, is also in preparation, as well as a large Geological Map of the Bavarian Tyrol, by M. Schafhäntl.

As I happen to know that the admirable sheets of our own Geological Survey of Great Britain and Ireland, conducted by Sir Henry T. De la Beche (the result of the united labour of many hands and heads), have been presented to the Bavarian Government, may we not hope that the works of all the geologists who have examined the Bavarian Tyrol and the adjacent tracts, shall, like those of our own survey, be digested into a true principle of classification, before geological colours be applied to the very varied rocks of that complicated and metamorphosed region? In truth, a map cannot be called geological which, like a general one of M. Schafhäntl (of which we have received a sample), represents masses known to be of the same geological age, under different colours, expressive chiefly of their litho-

* Sammlung der Höhenmessungen in der Rheinprovinz, von Dr. H. von Dechen. Bonn, 1852.

logical variations. A map so coloured may be curious, and even valuable, as a petrographical index, and as the result of minute labour; but is foreign to that methodical arrangement on which geological order can alone be founded.

Switzerland.—In speaking of the progress which has been made in the topographical survey of Switzerland, I would specially direct your attention to four sheets of the cantons of Appenzell and St. Gallen, which M. Ziegler, of Winterthur, who has drawn and executed them, has just presented to us. They form part of a survey on the same large scale of $2\frac{1}{2}$ inches to a mile, or $\frac{1}{100000}$, which is also in the course of application to the cantons of Zurich and Schaffhausen. To give full effect to *these four sheets only*, M. Ziegler passed *six consecutive summers* in the mountains and valleys of St. Gallen and Appenzell, the geometrical measurements of which had been made under the direction of M. Eschmann. The inspection of the results will, I am sure, lead any of you who have studied map-making to agree with me, that they are samples of a fidelity to nature which has rarely been attained. M. Ziegler soon found (M. Leopold von Buch and M. Escher von der Linth being his counsellors) that every class of rock has a peculiar "facies," and hence he became convinced, that no really good topography can be made by surveyors who neglect geological data. Thus, in these sheets the eye of a geologist at once seizes the rugged escarpments of slaty rocks, the undulations of limestone, or the bosses of conglomerate or nagelfluë; whilst, from personal inspection of a portion of the difficult region here represented, I can truly say, that I never yet saw a map more completely ready to receive the colours of a field geologist. The lights are all thrown in perpendicularly, so that the defects of the maps of Geneva and Vaud, as proceeding from oblique shading, are avoided, and the altitude of each terrace, valley, or mountain top is inserted in numbers on a most exquisitely finished lithographic relief. I am authorized by M. Ziegler to say, that, if the large scale of $2\frac{1}{2}$ inches to a mile had not been determined upon, he could have delineated as effectively all the same features on a scale of about $1\frac{1}{2}$ inches to the mile. In these works we perceive at a glance the value of good hill-shading; and when the map of the magnificent mountain of Sentis, which stands out to the low countries of Germany as the great sentinel of the Swiss Alps, is forwarded to us, you will see in it how perfectly such a work may supersede the want of any model whatever.

The largest part of the cantons of the Grisons and of Tessin has been surveyed; but detailed maps of this mountainous region are still

wanting, as well as those of large portions of Berne, which are constructing on the scale of the general Swiss map directed by General Dufour, or $\frac{1}{100,000}$ inch to the mile. It is much to be regretted that the scale of these Swiss maps varies in different cantons. In the mean time we are much indebted to M. Ziegler for a small, useful, general map of Switzerland, which he has published, and which will, I am assured, be soon coloured geologically by Professor Studer of Berne, whose acquaintance with the structure of the Swiss Alps is more extensive than that of any other living geologist.

Our library has been enriched by a panoramic view of the Alps, taken from Coligny, north of Geneva, by Professor Chaix, our able correspondent of that city, who has obligingly communicated to us an account of the progress of observation in Switzerland, and the corrections of positions and heights of mountains as determined by trigonometrical survey.

Austria.—Excursions not unfrequent with hammer in hand, have long made me familiar with the excellence of the maps executed by the Imperial Geographical Institute of Austria, and Englishmen were gratified last year by seeing the fine execution of many of these works in the Great Exhibition of Industry. As geographers, we have been fortunate in being honoured with a presentation of a series of productions which justly obtained one of the Council Medals of that Royal Exhibition; and on our part we have testified our sense of the intelligence which guides the military survey of Austria by electing its distinguished director, Lieut.-General Skribanek, an Honorary member of our Society. Of these works, which have been so greatly admired and appreciated in England, the large map of the environs of Vienna, on a scale of $\frac{1}{100,000}$, the hills being in lithograph relief, and the cultivated land in colour, and a map of Europe showing the application of printing in colour, are now suspended on our staircase. Our library is also copiously enriched by other works from the same source, consisting of the already published sheets of the new topographical Map of Central Italy in 49 large sheets, which, though lithographed, have almost the strength of copperplate; of the Lombardo-Venetian States in 14 sheets, on the scale of $\frac{1}{100,000}$; of Moravia and Austrian Silesia in 19 sheets; of Bohemia in 38 sheets, on a scale of $\frac{1}{100,000}$; and also of the Tyrol and Vorarlberg, and of Styria and Illyria.

Some of these productions are the result of long labours in the field, and others indicate the high interest which the young Emperor of Austria feels in every improvement in our science, including extended astronomical operations, observations, and surveys; the whole

having been conducted by a special corps of geographical engineers under the direction of scientific officers of the Imperial army.

I must indeed add, in justice to the surveying and mapping labours of the Austrians, that, with the exception of Piedmont, Tuscany, and Naples, many parts of the peninsula of Italy might long have remained unknown to geographers without the continuous application of the Imperial engineers. Thus, not satisfied with the production of the fine maps of the Venetian and Lombard States, followed by those of the duchies of Modena, Parma, &c., the Imperial Government has actually completed the survey of Tuscany and the Papal States. I am further assured, that several sheets (on a scale of about $\frac{1}{2}$ inch to the mile) are already engraved of the last-mentioned territory, whose geographical condition has been more benighted than that of other European countries. We may therefore hope that the time is fast approaching when the geologist and the antiquary may be better enabled to delineate the structure of the subsoil, and the scenes of the ancient glory of Rome.

Of the progress made by the geographers of Sardinia in the north, and of Naples in the south of Italy, I hope to speak at the ensuing anniversary.

In the mean time I am happy to announce, as coming from the pen of our correspondent Eugenio Balbi, the second part of the well-condensed small work, entitled '*Nuovi Elementi di Geografia,*' which will doubtless be of great use to his Italian countrymen. It is gratifying to see the son following in the footsteps of the father, and thus completing and carrying out a work which our lamented foreign member, Adriano Balbi, had hoped to terminate, and which, from its comprehensive arrangement, is worthy of our deceased associate.

Belgium.—Those who wish to know how copious is the list of excellent geographical works in the kingdom of the Belgians must consult the rich catalogue of our Member M. Vander Maelen; for it would exceed my limits if I were to attempt to enumerate even the chief of these materials. I will, however, specially call your attention to a geological map of the kingdom which is in course of publication by my distinguished friend M. Dumont of Liege, whose power in unravelling the curvatures of subterranean strata, and in showing their successive outcrops at the surface, is almost unrivalled.

Holland.—That good maritime geographer and correspondent of this Society, the Chevalier Jacob Swart, has forwarded to us the whole of his valuable work, the Dutch Nautical Magazine, and two sheets of a new Chart of the seas north of Macassar. He also announces that he is preparing a new Directory of the Archipelago of the Moluccas, and

that the government of the Netherlands has decided on the execution of a large Map of the State in 64 sheets, as well as of a general Geological Map of the Kingdom.

The Zuider Zee has also been minutely surveyed for the first time, and the chart, in a single sheet, was published at Amsterdam in 1851.

France.—Our contemporaries of France have officially reported to us, through M. Jomard and M. de la Roquette, that the Geographical Society of Paris has this year awarded its large silver medals to the African travellers, Livingston, Oswell, Rebmann, and Krapf, and to the Arabian explorer Wallin, stating at the same time that honourable mention has been made of our countrymen, Thomson, Hooker, Strachey, Cunningham, Stokes, and Brunner, and of the American Squiers, for their researches in the Himalaya, New Zealand, and Central America.

Such a shower of medals and praise is a specimen of foreign invasion, for which we are much indebted to our good friends on the other side of the Channel.

Allusion will here only be made to the operations of the French Government at and near home; the researches executed by Frenchmen in South America or distant countries being noticed in other parts of this discourse.

French Maps and Charts.—During the past year the Dépôt de la Marine has published several important works connected with hydrography, including charts of the Pacific, of the south of France, the shores of the Mediterranean, &c. &c.

The best perhaps of all the publications of the Dépôt de la Marine is that of three new charts of the coasts of Italy, and one of the island of Gorgona, from the elaborate surveys of Messrs. Duperré and Bégar, embracing the seaboard from the Gulf of Spezzia to the Canal of Piombino. During next year and the following the survey of the Italian coast will be carried as far as the Neapolitan frontier, where the labours of the French surveyors will probably terminate. A portion of the Ligurian coast of the west of Italy will only then remain to be surveyed, which it is the intention of the French Government to complete.

Besides its charts, the Dépôt de la Marine has published a new volume of the Nautical Instructions for the Coasts of France, to accompany the 'Pilote Français;' a series of sailing directions by Capt. Kérhallet for the Azores, the Canaries, and the western coast of Africa, in examining which this well-known officer was for several years engaged; and three very useful volumes on the winds, currents,

&c., of the Atlantic, Pacific, and Indian Oceans. The Society is indebted to the *Dépôt de la Marine*, through its distinguished director, Admiral Mathieu, President of the Geographical Society of Paris, for the possession of these valuable works.

Soon after the occupation of Algiers the French Admiralty directed an accurate survey to be made of the coast of that country by Admiral Berard and M. Dortet de Tessen; but between the point where it ceased at the Zafarina Islands, and the Straits of Gibraltar, a very large extent of seaboard required examination, including the northern coast of the empire of Morocco. This survey is about to be confided to Captain Kertballet, who will be accompanied by one of the best hydrographical engineers of France, M. Vincendon Dumoulin, who acted in the same capacity during the last voyage of circumnavigation with the late Admiral Dumont d'Urville.

The activity of the *Dépôt de la Guerre* has gone on increasing during the past year. Seven sheets of the great Military Map of France appeared in 1851, making 149 out of 258, of which it is to be composed, already published: of the sheets that remain, the engraving of several is far advanced, and, until their completion, it is expected that 12 will be published annually. At present nearly 60 officers of the staff are employed in the operations connected with the survey; and to show how our neighbours manage such matters, it may be stated, that since the survey was commenced in 1818, 2250 officers have been employed on it—*i.e.* in the geodesic and topographical operations alone, which are only confided to persons of education like themselves. The annual vote for the expenses of the survey, engraving, &c., does not exceed 30,000*l.* It is, I may add, calculated that the whole of the geodesic and topographical operations will be completed in 1855, and that before 1860 the engraving of this great monument to geographical science will have been completed.

It may here be mentioned that Col. Peytier, now director of the Topographical Department at the *Dépôt de la Guerre*, whilst employed in the French expedition to the Morea, surveyed the whole of the present Hellenic kingdom. The results have just appeared in the form of a very beautiful map of Greece, in 30 sheets, engraved on stone.

Connected with the topographical surveys carrying on by the French, during their occupation of Rome and its territory, let me state that it has been found necessary to re-determine the length of the base line, measured by Boscovich in 1780 on the Via Appia, and that Commander Rozet, an officer of the staff corps, an able geologist and sur-

veyor, has received a mission for that purpose from the director of the geodesic operations at the Dépôt de la Guerre.

Spain and Portugal.—In the year 1850 I presented to the British Association at Edinburgh the first true general sketch of a geological map of Spain, as prepared by my fellow-labourer in Russia and elsewhere, M. Ed. de Verneuil; and I may now state that he is at present labouring hard in that country. At our next anniversary, I hope, indeed, to have it in my power to indicate the advances which are being made in positive geography in a peninsula which may be justly proud, not only of producing so large a proportion of the early discoverers of the New World, and of the modern route to India, but also of having given us in these days most eminent geographers: among these, is Don Pascual Madoz, the author of the ‘Diccionario Geografico-Estadístico-Histórico de España.’ The addition of this most important work (with the maps constructed by M. de Coello) to our library has most properly been specially dwelt upon by the Council.

The new feature in Portugal within my knowledge which has the greatest interest, is the very graphic and detailed topographical delineation of the wine districts of the Douro and Alto Douro, engraved under the direction of our associate, Mr. J. James Forrester of Oporto, and presented to us by him.

SOUTH AMERICA.

Among the contributions to the geography of the South American continent, the work of our Vice-President, Sir Woodbine Parish, on the Provinces of the Rio de la Plata, holds a very important place. Professing to be the second edition of a former book, it is in reality almost a new work, from the great quantity of valuable fresh matter it contains on the geography, statistics, natural history, and geology of this portion of the world. Several additions have been made to the map by Mr. Arrowsmith, drawn for the former edition, founded upon recent discoveries; and Mr. Petermann, by whom it has been executed under Sir W. Parish's direction, has added two sections, of much value to physical geographers, of the continent from the Pacific to the Atlantic, and from Buenos Ayres to Cuzco, based on the barometrical observations of Messrs. Miers, Bauza, Redhead, Pentland, &c.

Four new sheets of M. Gaye's maps of the provinces of Chili have been published since our last anniversary—viz. Maypu, Santiago, Aconcagua. Three sheets more will complete this important general map of the entire Republic. In the mean time, our thanks are due to

M. Gaye for the manner in which he has executed the topographical and geographical parts of the work confided to him, and to the Chilean Government for the encouragement and support it has extended to the author in the publication of his researches on the history, geography, and natural history of its favoured territory.

M. de Castelnau, who had already published the narrative of his journey from Rio Janeiro to Peru, and thence down the Ucayali and Amazon to Pará, has recently commenced the publication of a set of illustrations to accompany it. The four fasciculi that have appeared contain several itinerary sketch-maps of the countries traversed, but on perhaps too large a scale. There are also some geological sections; and the author promises a series of drawings of the ancient monuments of Peru.

Our countryman Dr. Weddell, a relation of the celebrated navigator, and who now fills the place of Assistant Botanical Professor at the Jardin des Plantes in Paris, had returned to the Andes of Bolivia in 1850. During his second stay there, he visited the auriferous district of Tipuani, and navigated some of the rivers descending from the eastern slopes of the Bolivian Andes, whose course was little known. He has also fixed barometrically the height of some very elevated passes in the Eastern Cordillera. Dr. Weddell, who accompanied M. de Castelnau, and who wrote an interesting volume on the southern provinces of Bolivia, is now engaged in drawing up an account of his last journey, an abstract of which he read at the last annual meeting of the Geographical Society of France.

ASIA.

The Himalaya, Tibet, and Hindostan.—That part of Asia, to which Englishmen attach deep interest, as constituting the northern frontier of our Indian possessions, which geographers revere as the loftiest region of the earth, and which it has been the ambition of Humboldt through life to visit in person, has in the last few years been most successfully explored.

It was for these reasons that I rejoiced in seeing one of our gold medals adjudicated to the person among that band of recent travellers in the Himalaya range, who has been the surveyor of a large portion of it. But having given due honour to the constructor of a new map of so very difficult and inaccessible a region, and having alluded to the labours of the brothers Strachey, I must not omit to do justice to others, particularly to Dr. Hooker and Dr. Thomson, to whose progress one of my predecessors, Mr. W. J. Hamilton, formerly

adverted;*—travellers who, in extending our knowledge of the range on its eastern, western, and northern extremities, are about to publish their illustrations of the physical features, meteorology, and vegetation of the mighty Himalaya.

Dr. J. D. Hooker, who inherits the botanical eminence of his father Sir William, has examined the central portions of the chain, which, throwing out the Sikkim mountains, including Kinchinjunga, as a southern spur, extend between the 27th and 28th degrees of north latitude to the frontiers of Tibet. This naturalist has prepared two maps, which will soon be published: one of them will indicate his travels in the Khasia and Jyntea mountains between the Burram-pooter of Assam and the plains of Bengal, including the towns of Sylhet and Jyntea on the south, and Nurlung and Nunklow on the north; the other will embrace the whole of the Sikkim Himalaya, E. Nepal, with the adjacent provinces of Tibet to the north. In travelling eastward to Nepal, our traveller ascended the Tambur branch of the Arun to Tibetan passes 17,000 feet high, and explored the courses of several rivers as well as of glaciers and moraines.†

Among many other researches, Dr. Hooker traced the course of all the Sikkim rivers to their sources in Tibet, and examined glaciers and moraines at heights extending to 19,000 feet, determining that the Arun River, which rises in Tibet (west of Turner's Lakes), flows for 100 miles to the south-west before entering Nepal.

When joined by Dr. Campbell in the autumn of the same year, Dr. Hooker entered Tibet, and twice ascended Bhomtso (18,400 feet), having Kinchinjunga (28,178 feet) in full view to the south-west, and Chumalari (23,930 feet) to the south-east.‡ What geographer does not envy the botanist who, in that sublime position, observed angular heights of the surrounding peaks, the highest in the world? The imprisonment of the travellers Hooker and Campbell, by a faction of the Court of Sikkim, during two months, did not take place till after they had properly satisfied themselves of the same fact, which Captain H. Sturtey and others had ascertained in the more central and eastern parts of the chain—viz. that the country of Tibet, to the north of the snowy Himalaya, is no plain nor plateau, but presents for seventy miles a succession of mountains which, though ranging

* *Journal of the Royal Geographical Society*, vol. xix., President's Discourse, p. lxi.

† See Map prepared by Mr. Petermann to illustrate Dr. Hooker's Memoir, vol. ix. p. 49.

‡ These heights have been determined by Colonel Waugh, the Surveyor-General of India, and his assistants.

from 19,000 to 20,000 feet in height, with flat narrow valleys between, are wholly uncovered by snow. Unable on this occasion to enumerate all the mountain journeys of Dr. Hooker, still less to advert to those he performed in the lower and hilly tracts at the head of the Bay of Bengal, let me here only say, that he used continually, and with great success, the most delicate meteorological instruments. Indeed, he brought back safe a barometer (a rare feat among travellers), which is now hanging alongside the standard instrument of the Royal Society with an error of only ± 0.05 .*

Dr. Hooker's general observations on the geographical distribution of plants from low hills to the loftiest mountains, are of the highest interest; shrubby rhododendrons having been gathered at 17,500 feet; grasses, sedges, composite, and other tufted herbs at 18,000 feet; and lichens at 18,500 feet above the sea. His other labours, united with those of Capt. Richard Strachey, printed in our volumes and in the *Journal of the Asiatic Society of Bengal*, will enable us to form a tolerably just estimate of the geological structure of the Himalaya; whilst to geographers the maps already alluded to, and which Dr. Hooker never could have executed but for the vigorous measures adopted by the Governor-General, the Marquess of Dalhousie, will, I hope, be published before our next anniversary. He will confirm the statement, first published by Dr. Thomson, and afterwards by Capt. R. Strachey, that the Himalaya mountain ridge of our maps is an imaginary line drawn through certain lofty peaks which, catching all the moisture of Hindostan, retain it in snow and ice; and that these, far from being the real axis, are very distant from it. He will also show, that the central and eastern portions of the chain coincide in their main features with those described by the brothers Strachey to the west of the Lake of Minasarowar, and that there is no plain (properly so called) of Tibet, though the rivers flow for some distances in broad valleys before they are encaused in the mountain gorges through which they escape. Much interest too will attach to the phenomena of glacial action, which Dr. Hooker and Dr. Thomson (of whom I am about to speak) have the materials to illustrate; and I shall be much mistaken if their data will not bear out the inferences long contended for by the school of geologists to which I belong, that all true "moraines" of even the most gigantic glaciers have restricted limits; and, consequently, that no erratic blocks which (unaccompanied by "moraines") have been trans-

* Some accounts of Dr. Hooker's travels are given in the *Journal of the Asiatic Society of Bengal*; and his large work is preparing for the press.

ported for hundreds of miles from the source of their origin, can ever have been moved thither by solid terrestrial ice, though they may have been conveyed in floating ice-rafts.

This generalization, and the views I referred to on presenting the gold medal to Captain H. Strachey, are, indeed, in good part derived from, and sustained by the researches of Dr. Thomson. Leaving Major Cunningham, the accomplished director of the Tibet mission, with whom (by order of Lord Hardinge) this zealous botanist traversed the Himalaya from Simla in 1847, he passed to Lé whilst Major Cunningham proceeded to explore the antiquities of the valley of Kashmir,* and Captain H. Strachey to survey the Upper Indus. Dr. Thomson examined the valley of the Shayuk to Iskardo; and after visiting Rondu on the Indus, re-traversed the whole chain by Kashmir to Jammu in the Punjab. In his next journey he travelled across the Himalaya, on a hitherto unexamined route, to the Tibetan valley of Zaskar, and thence again to Lé; whence, ascending the Nubra River to the north, and crossing lofty glaciers, as described in our Journal,† he descended into the valley of the Shayuk at Sassar, 15,000 feet above the sea, where vast streams of ice, descending from heights of 23,000 feet, cross and dam up the River Shayuk. From that point, a journey of five days through an uninhabited mountainous country, brought him to the Kara Korum pass of the Kuen Lun Mountains, elevated about 18,500 feet above the sea, and bordering the possessions of Gholab Sing and the province of Yarkand in China. Dr. Thomson's work, now in the press, contains an account of his most adventurous and remarkable journeys during two years; in the last of which, reaching a higher latitude in Tibet than any modern traveller, he determined the great geographical fact, that the Kuen-Lun is simply the northern flank of the Himalaya, as now laid down in the map prepared by Captain H. Strachey.‡ The volumes will also contain some very remarkable geological data, including the discovery of tertiary fossils at heights of from 10,000 to 15,000 feet, and flanking the valleys of the Indus and its tributaries. Such arduous and successful labours will, I am sure, obtain for this enterprising botanist,

* Major Cunningham published, I am told, an elaborate and learned account of these antiquities in the *Journal of the Asiatic Society of Bengal*; and I have also been assured that he is a good Tibetan geographer, and has prepared two elaborate maps of the countries he visited, which have only lately arrived in England.

† Vol. xix. p. 29.

‡ See a brief sketch of this discovery, *Journal Royal Geographical Society*, vol. xix. p. 29.

and for the other Tibetan explorers of whom I have spoken, the warm acknowledgments of all true geographers.

As Englishmen, we have, indeed, good reason to be proud of the zeal with which, since the days of Colebrooke, Moorcroft, Herbert, Guthrie, the brothers Gerard, and Trebeck, our countrymen have been rendering us familiar with this chain; and it is satisfactory to know that our member Mr. Vigne, the first of the modern explorers of Kashmir after our medallist Baron Hügel, has been succeeded by Mr. Vans Agnew (so unfortunately murdered at Mooltan) and Lieut. Ralph Young, both of the East India Company's service. These gentlemen, accompanied by our associate Mr. Winterbottom, passed from Kashmir through Hussora to Gilgit, and thence by the valley of the Indus, returning to Kashmir by the Dras; and the result has been placed before you in the map of a region previously unknown.

Although I must not here dilate on the geological data obtained from different parts of Hindostan, I may observe that, as Dr. Andrew Fleming has shown that the salt range of the North Punjab exhibits palæozoic and secondary rocks covered by ammonite limestone, that ridge, however low, may thus be considered the southernmost parallel of the great Himalaya chain, which in several parts, including Kashmir, exhibits a like structure. Whilst the salt of the Punjab lies in a stratum below the mountain (*carboniferous*) limestone of Europe, that is to say, in strata of an antiquity hitherto unknown in Hindostan (*old Red Sandstone*), the coal and iron of the district of Churra Poonjee, or the range of hills which separates Assam and the Burmahpooter from the plains of Sylhet, belong (as Professor Oldham writes to me) to the ammonite tertiary formation. These facts demonstrate, what travelled modern geologists well know, that the presence of such minerals is no test of the age of rocks; for a geologist who only knew the British succession would be surprised to find useful coal of the age of the London clay, and rock salt, beneath the oldest carboniferous deposits.

In quitting the consideration of this region, I have to remind you, that an instructive map of the region of Scinde and tracts flanking the Indus has been made, and presented to us by Colonel Nell Campbell, who has recently joined our Society.

China.—If a long time is destined to elapse before a good map of China can be expected (for Mr. Gützlaff has left us only undigested materials), we have at least obtained some insight into the interior of this vast empire through the lively volumes of the French missionaries, Hue and Gabet.

Our countryman Mr. Fortune, who five years ago introduced us to

the interior of China, has just issued a very spirited and agreeable, as well as an instructive account of the tea-growing provinces, which indicates that the tea shrub, like the vine (*Bacchus amat colles*), only gives off its finest flavour when planted on the slopes of hills, and in the debris and alluvial soil derived from higher mountains. The zeal of Mr. Fortune, and the skill with which he has not only obtained the finest varieties of the tea-plant, but has also directed its culture in Assam and the north-western provinces of India, must prove of substantial service to our country. In the mean time, geographers have to thank him for a very good account of the habits of the people, and for a graphic delineation of the Bohea mountains, which from his description highly merit the exploration of the geologist. His map exhibits at a glance the geographical distribution of the tea-plant.

Mandchouria.—Some light has been thrown on the great northern region of China beyond the Wall called Mandchouria, by French missionaries detached from the head-quarters of the Christian community established in the province of Lia-tong (Moud-ken). One of these, M. de la Brunière, was assassinated; but his course was afterwards tracked by M. Venault, who, after traversing desert lands, descended the Sungari and the Amur, through the country of the long-haired Tatars, to the district of the Kilimi (where La Brunière was murdered), not far from the mouth of the great river Amur, where the Russians had a fort in the 17th century. According to M. Venault, the Russians still often come among the Kilimi and long-haired Tatars for purposes of trade and barter, and some of them are about to build a town at Paulo. Before the treaty of Nerchinsk in 1687, Russia had forts and posts on the left bank of the River Amur; and as the Americans are making efforts to bring about a trade with Japan, the Imperial Government may on its part possibly endeavour to realize the words of the French missionaries, "that Divine Providence may some day make use of the Russians to open out to Christians the northern isles of Japan."*

Borneo.—Mr. John Crawford, one of our early members, the author of the 'Embassy to Ava,' and of a Malay Grammar and Dictionary, brought before us recently a Memoir on the Geography and Statistics of Borneo, the largest island in the world; in this he gave a sketch of its mineral, vegetable, and animal productions, together with an account of its aboriginal inhabitants and its foreign settlers, such as the Malays, the people of Celebes, and the Chinese.

* Annals of the Propagation of the Faith, vol. xiii. p. 93, March 1832.

The most remarkable minerals are gold, diamonds, antimony, iron, and coal. The gold produce Mr. Crawford is disposed to estimate at one million per annum; some 50,000 Chinese being chiefly engaged in collecting it. The coal-fields, as far as they are at present ascertained, are of considerable extent, occurring both on the north and south shores. Among the useful plants, besides those common to intertropical agriculture, is the camphor-tree, *Dryobalanops camphora*, the produce of which sells in China for its weight in silver. In the forests are found the wild hog and the *Boa Sundaicus*; but the royal tiger, so abundant in the neighbouring islands of Sumatra and Java, and in the Malayan peninsula, is stated not to exist here. A full account is given by Mr. Crawford of the strange manners of the aboriginal inhabitants, far advanced in civilization beyond the usual state of society of the majority of the intertropical people of America, and in some respects above that of the inhabitants of the South Sea Islands, but far below the condition of the chief tribes of Java, Sumatra, and the Spice Islands.

I would here remind you that at the last meeting of the British Association, our medallist Sir James Brooke, the Rajah of Sarawak, directed attention to some additional knowledge that had been obtained of the geography of the extreme north end of the island, including the mountain of Kini bala, the height of which is estimated at 13,698 feet. It appears that Mr. H. Low, Secretary to the Government at Labuan, in Borneo, ascended it to a height of 8500 feet, collected many curious plants, and found that it was wholly composed of gneiss and granite, the lower hills of Borneo being formed of sandstone. From our necessarily circumscribed relation to the inhabitants of the larger portion of this vast mass of land, many years will probably elapse before we are even tolerably well acquainted with the geography and structure of its interior.

Arabia.—The south-east coast of this region of the earth, so rich and powerful in former periods and now so desolate, had received valuable illustration from the researches of Captain Haines, whose memoirs are published in the 9th and 15th volumes of this Journal; and the survey of the remaining parts of the same coast having been completed by Captain Saunders and Lieutenant Grieve, of the Indian Navy, they have now been geographically and geologically described by Mr. Carter, who served as medical officer of the Company's surveying brig '*Palinurus*.'*

* Journal Bombay Branch Royal Asiatic Society, January 1851 and 1852.

The geological or anti-historic memoir explains how, in addition to the granitic and other eruptive and crystalline rocks, which prevail so much in Arabia, the author was enabled to detect an ascending order of sedimentary aqueous deposits, the lowest of which is a compact micaceous sandstone, overlaid by strata of the cretaceous period, and these by a very great thickness of the nummulite or lower tertiary formation, surmounted by younger tertiary deposits charged with corals, miliolites, and shells, approaching to and identical with species now living. It is gratifying to me to see how, in Arabia, as in the opposite coast of Africa, in Cabul, Scinde, Northern Hindostan, the Himalaya, Persia, and Egypt, the nummulite rocks form the chief and distinguishing mass; and how they occupy the same place as a true representative of the lower tertiary or eocene series which I assigned to them in the Alps and Apennines in the year 1848.*

In the Geographical Memoir of Mr. Carter you will find a clear account of the physical features of these parts of the coast which have been recently mapped for the East India Company—all the better delineated, as I think, because he is acquainted with their geological structure; it contains also a lively sketch of such of the inhabitants as he had access to, and a notice of the heights, including a most remarkable vertical face of cliffs 1900 feet above the sea, in the cavities of which the natives live.

Learned geographers will be gratified by this author's comparison of the present features with those described by the author of the *Periplus*, and by Ptolemy, and by the accurate agreement of the distances mentioned by them, particularly of the latter, with the measurements noted by our surveyors. The Ichthyophagi of Arrian are still the turtle-fed Arabs of Masira. Some incense ports of the ancient merchants are yet to be traced; and from what is stated as to the similarity of the subsoils and climate of this coast of Arabia and those of the opposite or Somali coast of Africa, it may be inferred that the author and our erudite associate Cooley, who places the chief aromatiferos region of the ancients in the latter country, are equally correct; and that frankincense, myrrh, and cinnamon were formerly brought from both shores.†

After many references to sacred as well as to profane history, Mr. Carter terminates his interesting memoir with a retrospect of the ter-

* Geological Structure of the Alps, Apennines, Carpathians, &c., *Journal Geological Society*, vol. v. p. 157.

† See Cooley's '*Regio Cinnamomifera*,' *Journal of the Royal Geographical Society*, vol. xix. p. 166.

rible changes which the Arabians have undergone during the past ages, when the Sabæans were succeeded by the Homerites or Hamyarites, the Persians, the Macedonians, and the Romans, and how with the overthrow of the Hamyaritic dynasty in the seventh century, this people, after embracing Mahomedanism, became one of the most powerful as well as richest nations of the earth. One geographical discovery—the passage round the Cape—destroyed that grandeur, and throwing open the commerce of India to the Europeans by another route, deprived the Arabians of their ancient office. “Aden has been seized,” as Mr. Carter writes, “the old route of commerce between the eastern and western nations has again been established; but the Arabs are no longer the carriers of that produce. They have become poor and divided among themselves, the religion of Mahomed is disappearing from among them fast, and they are returning to the heathenism and barbarity of their aboriginal state.”

In addition to the intimate knowledge which Professor Wallin, of Finland, had acquired of the interior of this sacred region, the fruits of which we are still reaping, and some of which of the highest value are about to appear in the next number of our Journal, it was the anxious desire of the Council to enable this profound scholar to revisit Arabia for a series of years, and there obtain a deeper insight into the real condition of very large interior tracts still entirely unknown to the civilized world. Arrangements with the Imperial Russian authorities, which were commenced under the presidency of my predecessor, had, I hoped, been concluded in the past year, which would have enabled the learned Finn to have obtained for us an amount of knowledge, which would have done honour to the united efforts of the Imperial Geographical Society and our own. Possessing no funds for the accomplishment of such a purpose, we could only promise to contribute the sum of 200*l.* advanced to us by the Government and the East India Company, adding to it on our part instruments, and procuring for the traveller a free passage, passports, and protection. The President of the Imperial Geographical Society, the Grand Duke Constantine, entered kindly into our views. Permission to travel for six years was obtained for M. Wallin (his salary as a Professor being continued to him while thus employed). The cost of his passage to St. Petersburg and England was to be defrayed, and a sum of money equal to 400*l.* sterling was to have been advanced; and thus we supposed that all was settled. It now, however, appears that M. Wallin expected a grant of 400*l.* annually, or 2600*l.* in all; but the Vice-President of the Imperial Society, M. Mouravief, has transmitted to

me a correspondence which clearly shows, that so large an expenditure was never contemplated by the Russian Geographical Society. The project is therefore suspended for the present, and M. Wallin has returned to Helsingfors.

It cannot, indeed, be expected that Russia should contribute more than England towards the execution of a survey, in which our ally is only concerned for the advancement of geography, whilst we may derive both real and scientific advantages from it; and it is therefore to be hoped that the East India Directors and our Government may still think it expedient to defray the cost of an expedition into the interior of Arabia by M. Wallin, who, from long habit, is a child of the desert, and perhaps the only European perfectly qualified by training and knowledge to dispel our ignorance of a land so interesting to the earliest history of mankind.

Projected new Lines of Intercourse between Europe and Asia.—At our last anniversary our attention was invited to a bold scheme of Mr. Asa Whitney, of New York, for the construction of a great railroad from Lake Michigan to California and the Pacific, the engineering merits of which it is not within the province of geographers to discuss. I have, however, little doubt that, if that sagacious man could have obtained possession of the territory on Lake Michigan, whence, as a starting-place, his fuel, wood and stone for the use of the railroad were to be derived, he could have successfully advanced a line of rails across the fertile prairie-grounds to the west (a noble field for emigration), and thus perhaps have founded a new state between Michigan and the Rocky Mountains; though the time might be distant before a complete chain of such intercourse with the Pacific could be established. Mr. A. Whitney endeavoured to show that, whilst a line across North America is much the shortest road to the richest countries of the East, no good results could follow from cutting a canal across the Isthmus of Central America; inasmuch as, besides the maritime dangers of the Gulf of Mexico, the distance to Hindostan and China is 600 miles shorter by the Cape of Good Hope than by passing through any part of Central America; and hence he not only was opposed to all Isthmus speculations, whether canals or railroads, but he also endeavoured to prove that no such intercourse between the two coasts of America would be of use to the inhabitants on either side of that continent. It is, however, to be noted that, under any circumstances, such an opening must be very advantageous to our flourishing colonies of Australia and New Zealand.

Since that time, Captain Syngé, R.E., has brought before you, in a clear and able manner, a patriotic project for traversing North America within the British boundaries. His plan, as far as the author's own knowledge of the country goes, is a well methodised and digested calculation or estimate, of a scheme, of which Major Carmichael Smyth, Mr. Nicolay, and others, have for some time been the zealous advocates.

There can be little doubt that, in reference to the eastern portion of this region, or the Canadian provinces, great shortening of distance and much national advantage must follow from the execution of the proposal respecting the construction of canals or railroads. Again, the facilitation of transport towards the west as far as Lake Superior, by the scheme of the author, may be looked at with much interest as being of value in a commercial point of view ; for in these matters an acquaintance with the country and the application of good engineering skill may be depended upon. But, when we endeavour to realise in imagination the formation of a great line of useful water intercourse between Lake Superior and the Pacific, or a new railroad, within those distant British territories, it seems to me that we must first have a complete survey of that region placed before us. The water project might, indeed, be compared to that by which Peter the Great united the head-waters of the rivers of Russia, and thus produced a net-work of communication through his empire. But in that case numerous peoples already located, had long felt the want of such an intercourse as was effected, by canals cut through soft, rich subsoil, and in tracts where the watersheds were separated by very slight elevations only. To the north-west, however, of Canada, we enter upon a region of hard granitic rocks, for the most part sterile, through parts of which the waters escape by rapids, where the portages are difficult and considerable, and where the differences of level have yet to be ascertained. The Earl of Selkirk and Dr. Rae, both well acquainted with it, have assured me that this country, in which the Hudson's Bay Company hold their far-insulated stations (which would be benefited by any such line of intercourse), offers very few spots, indeed, adapted for any sort of cultivation ; and that, being occupied by Indians and wild animals only, it presents obstacles almost insurmountable to the opening out of any commercial route through it. Again, to reach the Pacific by any line of canal carried westwards across the Rocky Mountains seems to be a remote contingency, in the absence of new geographical data respecting a region little explored since the days of Mackenzie in the last century. Far be it from me, however, to discourage the

patriotic projects of Major Carmichael Smyth and Captain Synge, relating to new works in the Canadas, which, as above stated, seem to be full of use and promise.

In the mean time intelligence reached me a few weeks ago of a proposition made to Congress by Mr. Ragan, a citizen of Natchitoches, whereby it is proposed to turn off a portion of the waters of the Mississippi where joined by the Missouri, and carry them northwards into Michigan and the great lakes, thus opening out a complete line of water carriage between the Rocky Mountains and the Atlantic, and saving the capital of Louisiana from its occasional inundations. But these grand speculations of the engineer need not further occupy our attention on the present occasion.

If we are not destined in our day to see the maritime commerce between Asia and Europe carried on across America, speculations have been revived for opening the line of the Euphrates. It is now contended that the best and shortest communication between England and Hindostan will be by railroad to Trieste, thence by steam to Beyrout or Seleucia,* whence passing by land to Bir, on the Euphrates, the traveller will thence descend in river steamers to the Persian Gulf, and thus reach Bombay by a much shorter route than that of the overland journey across Egypt. On this latter point I must refer you to the elaborate work of our distinguished associate Colonel Chesney for full information respecting the navigation of the Euphrates. If the Ottoman Government should be powerful enough to maintain a steady and safe transit from Beyrout to Bir, all difficulties may vanish before the will of Englishmen, and the value of time, or the gain of a few days, may possibly bring about a triumph over natural obstacles, and lay out a highway between India and Europe across the wild Syrian desert: thus re-opening the country of Babylon to the traffic of this adventurous generation.

AFRICA.

The explorations of different portions of Africa have been continued with such success, that even in the brief space of a year the vast blank on all former maps has been materially reduced. Mr. Oswell, who has just returned to England, and the missionary Livingston, his companion, to both of whom we are indebted for our

* A memoir will shortly be read by our associate Capt. W. Allen, R.N., on the capabilities for the restoration of the ancient harbour at Seleucia.

acquaintance with the 'Ngami Lake, have pushed their researches northwards to $17^{\circ} 25'$ S. latitude and between $24^{\circ} 30'$ and $26^{\circ} 50'$ E. longitude, and have traversed a considerable tract watered by deep and constantly flowing streams, which they believe to be feeders of the river Zambesi. We had learned from them that the Zouga, which runs to the east from the lake 'Ngami, is dissipated and absorbed in sands and salt-pans, and now we are told that these travellers passed over a large salt incrustation of about 100 miles in length and 15 miles in width, and saw many others lying to the north of the spot where the Zouga loses itself. Considerably to the north of these great natural salt-pans our countrymen met with a population more advanced in intelligence than most of the tribes of South Africa. They also relate as a striking incident, that shortly before their arrival, the slave-dealers had, *for the first time*, penetrated from the west coast, and through the temptation of gaudy European goods had purchased many children. Seeing that this country of Sebitoune (whose capital Sesheke was watered by a river from 400 to 500 yards wide at the end of an extremely dry season) abounds in many natural productions which might afford a good barter, Mr. Livingston suggests that English merchants might earn a legitimate profit by sending goods thither, and thus check the trade in slaves.

The effort to transfer enslaved people from the centre to the west coast of Africa may, however, be taken as a proof that the odious traffic is diminishing in that region of Western Africa which has hitherto been its head-quarters. On this subject I may refer you to a recent pamphlet published by one of our members, the Hon. Captain Denman, of the Royal Navy, for an excellent summary of the horrors exercised by the King of Dahomey, and for a just explanation of how effectively his tyrannies, slaughter, and capture of the surrounding people, have been checked by the late British victory at Lagos. Every philanthropist must rejoice, that by that exertion of our forces, the defenceless but rapidly improving people which border on the slave-dealing sovereigns of the Bight of Benin have been reassured in their independence;* and most heartily must we all wish that such haunts of misery as Lagos may be blotted out, and that these resorts of an improving black population which has crowded to Abbeokuta and Yoruba may be rendered marts of productive and honourable commerce.

An active young traveller, Mr. Cassiott, the son of the well-known

* See a very instructive chart prepared by Arrowsmith for Viscount Palmerston, showing the extent to which the slave trade on the west coast of Africa had been reduced in 1850.

electrician, has explored both coasts of South Africa to the north of the Cape Colony, but chiefly on the east, and pushed his excursion, under considerable difficulties, through a region occupied by the northern Boers, until he reached the Limpopo river.* Animated with the same zeal, he had scarcely brought to us his account of what he had seen, than he again departed to visit new regions of South Africa during the next two years.

Mr. F. Galton, to whose researches your attention was directed last year, and who has been absent during two years, has returned with an account of the result of his last travels. Having journeyed about 1600 miles between Walfisch Bay on the south, and Ondonga, in $17^{\circ} 58'$ S. latitude, near the Nourse river, on the north, and extending his explorations inland to the 21st degree of E. longitude, he has made a very important addition to our acquaintance with the geography of Southern Africa. Through this journey (accomplished entirely at the expense and by the energy of Mr. Galton) we obtain a description of the Dammaras people, who, though a race of fine stature, are in a low moral state and likely to be extinguished by the more powerful and enterprising Namaquas. The high table-land, which was traversed to reach the Ovampo, is cut through by deep ravines, the chief of which serve as escapes for the periodical floods of the rivers. Like his contemporaries on the eastern side of the African watershed, Mr. Galton passed over a great saline deposit, as if the residue of a desiccated lake, and met with a brackish, a tepid, and a very hot spring.

In delineating the moral character, as well as the physical conformation of the different tribes or nations of South Africa, it is interesting to observe, from the observations of Mr. Galton, how their differences are connected with the form, subsoil, and vegetation of their respective lands. Thus, the arid inland plateaux, covered only with thick jungles and short brushwood, hold the dwarfed and sinewy Bushman; the more open, hilly, and undulating pasture-lands the Dammaras, a nation of independent herdsmen, each chief of a family being supreme in his own little circle; whilst the rich corn-lands on the north are occupied by the race which is the most civilized and advanced, the Ovampo. Ondonga, the capital of this people (whose king would not permit our traveller to proceed northwards), is estimated to be about

* Another traveller, Mr. Dolman, and his English servant, who had left his companion, Mr. Moyle, have been murdered in an endeavour to join Mr. Oswell and Mr. Livingston; it being supposed that a Hottentot who accompanied them was the assassin. Other English travellers, Capt. Shelley and Mr. Boshe, who were in the same neighbourhood (north of Colesberg) in pursuit of game, went to the spot of the murder.

70 or 80 miles to the south of the great river Amorongo Achilunda, the Nourse of our maps.

This journey, together with other excursions towards the interior of Southern Africa, whether undertaken from the south or from the west, have led us to conclude that, whilst plateaux of some altitude fringe the coasts and advance some distance into the interior (rising, as in the Dammar country, according to Mr. Galton, to heights of about 5000 and 6000 feet above the sea), the more central country, instead of being a mountainous region, is a watershed of little greater elevation, whilst the most central region of all is of no great altitude, and is occupied by a succession of lakes, of which 'Ngami is the southernmost.

This is an important addition to our previous knowledge, one to which Mr. Galton's researches, in addition to those of Oswell and Livingston, have largely contributed; and when their memoirs are prepared for publication, accompanied as they will be by a number of astronomical observations which fix the longitude and latitude of many places, I do not doubt they will be found worthy of your warm approbation. In the mean time I will say that English gentlemen like Mr. Galton and Mr. Oswell, who accomplish at their own cost such results, have already won our hearty thanks.

It must be here stated that in the North of Africa our French contemporaries have done much good service. The publication of the work of Messrs. Galinier and Ferret, two French officers who visited Abyssinia in 1841-42, has been continued; and the fasciculi which have appeared during the past year contain, I am told, several maps of interest, especially one of a portion of that country founded on their own observations, two plans of the environs of Adde Hedout and of Adde Custo, besides a map of the southern portion of the Hedjaz. The zoological and botanical illustrations to the travels of Messrs. Galinier and Ferret are very beautiful.

M. Antoine d'Abbadie, as I am informed by Mr. Pentland, having employed Dr. Götze, a resident of Altona, to calculate the astronomical and geodesical observations made during his residence in Ethiopia, has commenced the construction of a map of the parts of those countries visited by him. He is also about to publish a catalogue of Ethiopian manuscripts at the Imprimerie Nationale, towards which the French Government has liberally contributed, by causing a new set of Ethiopian types to be cast for the work.

The Dépôt de la Guerre, at Paris, has published maps of the provinces of Constantine and Oran on a scale of $\frac{1}{400,000}$; of the environs

of Algiers and Bona on a scale of *xxxxxx*; and the Dépôt de la Marine has engraved plans of the ports of Bizerta and Collo.

Whilst it gives me great pleasure to observe that some of the views of the veteran African geographer Mr. M'Queen, in reference to Central and Southern Africa, as formerly laid down upon a map, have been sustained by modern researches, it will soon, I doubt not, be unnecessary to refer to Portuguese or any other old authorities; though I am assured by his Excellency Count de Lavradio, now accredited to our Court, that, if the archives at Lisbon were thoroughly searched, much more information would be obtained as to the interior of Africa from the records of the former exploits of our ancient allies. In the mean time, though many years may elapse before speculation can be set at rest in relation to large portions of the interior, whether derived from old or modern travels, I am glad to say that our desire to obtain a more extensive acquaintance with the region of Central Africa as opened out by Park, Denham, and Clapperton will, I trust, soon be gratified by accounts from those very enterprising German travellers, Barth and Overweg, who by the last advices were at the eastern end of Lake Tchad.

Our member, Lieutenant J. L. Macleod, R.N., has made a proposal to ascend the Niger *with the rising waters*, and, if circumstances should permit, to cross to the Gambia, and descend that river; and his plans, having been carefully examined by a Committee of our Council, have been favourably reported on. He has since had an interview with the First Lord of the Admiralty, and hopes are entertained that this zealous officer's proposed expedition may be carried out. In enterprises of this nature too much stress cannot be laid on the preliminary acquaintance of the projectors with the difficulties of climate which they will have to overcome; and as Lieutenant Macleod has served six years on the African coast, and has devised a very ingenious method of applying a steam launch to the ascent of the Niger, we may reasonably hope that such an expedition might succeed in throwing light on new sources of trade, as well as in defining more accurately the nature and outlines of that region. We may, indeed, attach the more importance to this scheme, as it is warmly supported by the Chamber of Commerce of Manchester, and by our energetic associate Mr. Macgregor Laird, who is quite ready to fulfil his part of the contract with Her Majesty's Government, and direct the ascent of any navigable river on that coast by a steamer capable of carrying goods and passengers.

Comparative View of Africa in Primeval and Modern Times.—

Geographers will be gratified to learn that a map of South Africa, compiled by our learned associate Mr. Cooley, and extending from the equator to 19° S. latitude, is about to appear under the execution of Mr. Arrowsmith. With such a valuable document, and with the map of the whole of the Cape Colony, we shall soon have before us a general sketch of the physical features of a large portion of this quarter of the globe. So much, however, has our knowledge increased by the valuable original map of the Cape Colony made upon the spot by Mr. Hall (of which Mr. Arrowsmith is preparing a reduction), that we are, as I will now endeavour to show, almost entitled to speculate on the prevailing structure of Africa being similar to that of its southernmost extremity.

In support of the general view to which I now call your attention, I must state that it has been suggested to my mind by the explanation of the geological phenomena of the Cape Colony by Mr. A. Bain. This modest but resolute man, having been for many years a road surveyor in the Colony, had, in all his excursions, collected specimens of the rocks and their organic remains: and, gradually making himself acquainted with the true principles of geology, he has at length traced the different formations, and delineated them on the above-mentioned map. In this way he has shown us that the oldest rocks (whether crystalline gneiss or clay-slate, here and there penetrated by granite) form a broken coast fringe around the Colony from the southern to its western and eastern shores, and are surmounted by sandstones which, from the fossils they contain, are the equivalents of the Silurian or oldest fossil-bearing rocks.* These primeval strata, occupying the higher grounds, of which the Table Mountain is an example, and dipping inland from all sides, are overlaid by carboniferous strata, in which if no good coal has yet been found, it is clear that its true place is ascertained; and as Mr. Bain has detected many species of fossil plants of that age, we may still find the mineral pabulum for the steamers which frequent these coasts.

Above all these ancient strata, and occupying, therefore, a great central trough or basin, strata occur which are remarkable from being charged with terrestrial and freshwater remains only; and it is in a portion of this great accumulation that Mr. Bain disinterred fossil bones of most peculiar quadrupeds. One of the types of these, which Professor Owen named *Dicynodon* from its bidental upper jaw, is a representative, during a remote secondary period, of the lacertine associates of the hippopotami of the present lakes and waters. The

* Mr. Bain himself so styles these rocks in the Map deposited in the Library of the Geological Society.

contemplation of this map has therefore led me to point out to you how wide is the field of thought which the labours of one hard-working geologist have given rise to, and to express, on my part, how truly we ought to recognize the merits of the pioneer among the rocks, who enables us, however inadequately, to speculate upon the entirely new and grand geographical phenomenon, that such as South Africa is now, such have been her main features during countless past ages, anterior to the creation of the human race. For the old rocks which form her outer fringe, unquestionably circled round an interior marshy or lacustrine country, in which the *Dicynodon* flourished at a time, when not a single animal was similar to any living thing which now inhabits the surface of our globe. The present ventral and meridian zone of waters, whether lakes, rivers, or marshes, extending from Lake Tchad to Lake 'Ngami, with hippopotami on their banks, are, therefore, but the great modern, residual, geographical phenomena of those of a mesozoic age. The differences, however, between the geological past of Africa and her present state are enormous. Since that primeval time the lands have been much elevated above the sea-level—eruptive rocks piercing in parts through them; deep rents and defiles have been suddenly formed in the subtending ridges, through which some rivers escape outwards, whilst others flowing inwards are lost in the interior sands and lakes; and with those great ancient changes entirely new races have been created.

Travellers will eventually ascertain whether the basin-shaped structure, which is here announced as having been the great feature of the most ancient, as it is of the actual geography of Southern Africa (*i. e.* from primeval times to the present day), does or does not extend into Northern Africa. Looking at that much broader portion of the continent, we have some reason to surmise, that the higher mountains also form, in a general sense, its flanks only. Thus, wherever the sources of the Nile may ultimately be fixed and defined, we are now pretty well assured that they lie in lofty mountains at no great distance from the east coast. In the absence of adequate data, we are not yet entitled to speculate too confidently on the true sources of the White Nile; but, judging from the observations of the missionaries Krapf and Reimann, and the position of the snow-capped mountains called Kilimanjaro and Kenia (only distant from the eastern sea about 300 miles), it may be said that there is no exploration in Africa, to which greater value would be attached than an ascent of them from the east coast, possibly from near Mombas. The adventurous travellers who shall first lay down the

true position of these equatorial snowy mountains (to which our Abyssinian Medallist, Dr. Beke, has often directed public attention), and who shall satisfy us that they not only throw off the waters of the White Nile to the north, but some to the east, and will further answer the query, whether they may not also shed off other streams to a great lacustrine and sandy interior of this continent, will be justly considered among the greatest benefactors of this age to geographical science!

The great east and west range of the Atlas, which in a similar general sense forms the northern frontier of Africa, is, indeed, already known to be composed of primeval strata and eruptive rocks, like those which encircle the Cape Colony on the south, and is equally fissured by transverse rents. As to the hills which fringe the west coast, and through apertures of which the Niger and the Gambia escape, we have yet to learn if they are representatives of similar ancient rocks, and thus complete the analogy of Northern with Southern Africa. But I venture to throw out the general suggestion of an original basin-like arrangement of all Africa, through the existence of a grand encircling girdle of the older rocks, which, though exhibited at certain distances from her present shores, is still external, as regards her vast interior.

Let me, therefore, impress on all travellers who may visit any part of Africa, that their researches will always be much increased in value, if they bring away with them (as I have just learned that Mr. Oswell has done) the smallest specimens of rocks containing fossil organic remains, and will note the general direction and inclination of the strata.

With no region of the old world have we been till very lately so ill acquainted as Africa. But now the light is dawning quickly upon us from all sides; and in the generation which follows, I have no doubt that many of the links in the chain of inductive reasoning, as to the history of the successively lost races of that part of the globe, will be made known, from the earliest recognizable zones of animal life, through the secondary and tertiary periods of geologists. Passing thence to the creation of mankind and to the subsequent accumulations of the great delta of the Nile, we have recently been put in the way of learning what has been the amount of wear and tear of the upland or granitic rocks, and what the additions to the great alluvial plain of Lower Egypt, since man inhabited that almost holy region, and erected in it some of his earliest monuments.* But how long will it be before we

* See the account of the instructive suggestions of my friend Mr. Leonard Horner, to ascertain the amount of the successive deposits in the lower valley of the

shall be able to calculate backwards by our finite measure of time, to those remote periods, in which some of the grandest physical features of this continent were impressed upon it, when the lofty mountains from which the Nile flows were elevated, and when the centre of Africa (certainly all its southern portion) was a great lacustrine jungle, inhabited by the *Dicynodon* and other lost races of animals?

Conclusion.—If I ought, Gentlemen, to apologize for the length to which these observations have been carried, you will, I know, excuse the individual whose chief anxiety has been to do his duty to you, and to the grand subject retrospective and prospective which has been placed before him.

The only desire now left for me to express is, that your future volumes may again expand to the dimensions they attained in those days when, in the ardour of our pursuit, we forgot that our means were not as national as our objects. But now, the *realis geographica* being revived, it is accompanied by such an increase of income that we can certainly publish, and do justice to every good memoir which may be submitted to us.

In truth, the twenty-one volumes of the Journal are the records of the dignity and usefulness of this Society. For although they contain some papers to which rigid critics may object as not coming strictly within our domain, it must be recollected that in a Society constituted like our own, the tastes and pursuits of many individuals who look at geography after their own manner, must be consulted; and thus it is that neither our numbers nor our spirit can be maintained, if our publications do not embrace ancient as well as modern geography, occasional descriptions of the produce of newly-discovered lands which may be useful to the mercantile community, and accounts of the habits and languages of distant people.

On the other hand, the pure physical geographer will rejoice to see that we have been accumulating valuable meteorological and astronomical data, which will form a good element in the construction of future publications, which we may now hope to see strengthened by the help of one of the leading terrestrial magneticians of the day, who has recently joined us.

Nile, as given in the *Edinburgh Philosophical Magazine* of July, 1830. Mr. Horner informs me that the researches are now going on vigorously on the site of Memphis, having been already applied to the site of Heliopolis; our Consul-General in Egypt, the Hon. C. Murray, taking a lively interest in their progress. The recently published *Journal* of our member, Capt. Peel, R.N., to Darfur, will well repay the perusal of the geographer from the number of good observations of positions it contains, and the best levelling of the Nile between Khartoum and Cairo.

Our volumes have, indeed, always seemed to me to be attractive and valuable, particularly as works of reference, precisely in the ratio of their varied composition. In them the scholar finds conveniently bound together stray leaves nowhere else to be met with, which explain or illustrate the classical writers of antiquity in the countries of Greece, Asia, and Egypt. Some of the most valuable of these have proceeded from the pens of our military associates, and others from surveying naval officers; so that, whatever may be the result of the new system of warlike education, it is gratifying to one who, like myself, can count back to the old stirring times, to appeal to works of many, whose attainments in learning were acquired under the régime of a Nelson and a Wellington.

Whilst this class of works has proved that the branch of our science which is comparative, necessarily involves an union of ancient lore with modern appliances, and whilst our auxiliary the Hakluyt Society is annually bringing to light the slightly known or hidden writings of the earliest discoverers of America and the Indies, we may well be satisfied with the copious stream of knowledge which we have endeavoured, at our own cost, to pour out annually concerning lands unknown to our ancestors.

Seeing, then, the spirit which animates Englishmen, and makes them such ubiquitous and undaunted travellers, I can have no doubt that at many ensuing anniversary meetings there will be laid before you lists of trophies as numerous as on the present occasion, and that thus our countrymen will continue to sustain the onward career of the Royal Geographical Society.

Postscript.—Whilst the last sheet of this discourse is undergoing a revise, I learn to my great satisfaction that the screw-schooner the *Label* will still be employed in the good cause of the search after Franklin, and more particularly in an endeavour to ascertain the fate of the crews which are supposed to have abandoned the two vessels seen floating on an iceberg (see p. lxxvi. *et seq.*). That spirited officer, Commander Inglefield, R.N., having received the vessel from Lady Franklin and the subscribers, has undertaken at his own risk and expense to complete the enterprise; and sailing early in July, he will, if possible, first visit Jones's and Smith's Sounds, and afterwards examine the west coast of Baffin's Bay and Labrador. Dr. Sutherland the naturalist, who was formerly with Captain Penny, will accompany Captain Inglefield; and Mr. Abernethy, who was ice-master in every British expedition, Arctic and Antarctic, of this century, has also engaged himself in this noble enterprise.—26th June, 1852.



PAPERS READ

BEFORE THE

ROYAL GEOGRAPHICAL SOCIETY.

- 1.—*Report of an Expedition under the Surveyor-General, Mr. J. S. Roe, to the South-Eastward of Perth, in Western Australia, between the months of September, 1848, and February, 1849, to the Hon. the Colonial Secretary.*

Communicated by the Colonial Office.

Read November 26, 1849.

Cape Riche, October 12, 1848.

Sir,—I avail myself of an opportunity, *via* King George's Sound, to report to his Excellency the Governor my arrival here yesterday with the party, which he has been pleased to place under my guidance, and my intention to proceed to-morrow north-eastward, on the further prosecution of the service intrusted to me.

The expedition having started from York on the 14th ultimo, ascended the Avon river, and took its final departure on the 17th from Nalyaring, the upper sheep-station in that district, following the compass direction of E. by S. $\frac{1}{2}$ S. as intermediate between tracts of country previously traversed. The rough plan of our route, which I have the honour to inclose, will show that in 15 miles we passed gradually from good grassy country about Nalyaring to scrubby sand-plains and eucalyptus thickets. At 34 miles we met with a tribe of natives who, although at first alarmed and suspicious, soon became friendly and useful, showing us several springs and wells of good water on our route, extending 50 miles to the boundary of their own immediate country. At this time we had descended from an elevated tract of sandy plains covered with low scrubby vegetation, and were threading a vast chain of small shallow salt lagoons, in a wide valley of thick scrub, several miles in extent, coming from the S.E., and extending in the opposite direction and westward, towards that part of the Avon a little above Jarakine Pool. The natives gave us to understand there was good grass in the valley of the river, between that pool and our camp at Yurakine, but that higher up the valley was poor and worthless; I therefore quitted it, and proceeded eastward to the meridian of 119° E., where, finding that the country did not improve, and that we looked out to the

N.E. and S.E., over 15 or 20 miles of land apparently unfit for any useful purpose, or capable of affording subsistence for our horses, I turned to the S.S.W., towards the Stirling range, to accomplish the ultimate portion of my instructions before the dry season should become too far advanced.

At the end of 25 miles we recrossed the extensive system of salt lakes belonging to the Avon branch, already mentioned, and gradually ascended an extensive tract of elevated sand plains, which furnish the sources of the rivers Avon, Williams, Arthur, Buchanan, and Beaufort. The sharp, keen air of that region, and the difficulty we experienced in keeping ourselves warm, especially when exposed to the pelting hail, which was frequently brought along by a strong S.W. wind, induced me to conclude that our elevation above the sea-level could not be less than 1800 or 2000 feet.

Descending to the southward, through very thick country, or over scrubby sand plains, we forced our way across an intricate wide valley, in lat. $33^{\circ} 16'$ S., in which were scattered small pools of fresh water, inclining westward, in a shallow clay bed, being probably near the source of the Buchanan river, the highest known portion of which was 80 miles distant, in the same latitude.

The country continued poor and unpromising, with some few exceptions, for 55 miles further, when we emerged from a very dense scrubby thicket, which we had found some difficulty in forcing, upon a system of waters falling into the S. coast, and were rejoiced and relieved at finding both water and grass for the supply of our half-famished horses. This proved to be a branch of the Pallinup river, which we followed downwards to our intended camp of Poilyenup, near the N.E. extremity of the Stirling range, meeting with excellent grass and abundance of water in its valley. The weather had, indeed, set in boisterous and wet from the S.W., and rendered the country so exceedingly soft that it was with difficulty we proceeded.

The future route of the expedition must necessarily greatly depend upon circumstances; but as I learn that a branch of the Pallinup comes from the N.E. and joins the main river at 12 or 15 miles from its mouth, I have deemed it advisable to try the north-eastern country by that route as far as practicable, starting with supplies for 90 days.

Having now as briefly as possible detailed the principal occurrences connected with my past movements and future intentions, I can but regret that the former have proved of value chiefly in a geographical point of view, although much good and available country, both arable and pastoral, has been seen in patches adapted to limited operations; but I beg to assure his

Excellency that in the remainder of my proceedings, let them be in what direction they may, for carrying out the ultimate views of the Government, my best exertions shall be used for rendering the expedition as productive as possible of public benefit.

I am much indebted to Messrs. H. Gregory and Ridley for their valuable assistance, promptly and cheerfully rendered whenever necessary; and have great pleasure in reporting the uniformly steady good conduct of privates Lee and Buck,—the whole being animated by the best spirit.

Surveyor-General's Office, Perth, 10th March, 1849.

SIR,—I have the honour to report to his Excellency the Governor my return to head-quarters, on the 2nd ultimo, with the expedition under my charge, which left Perth on the 8th of September last, for the purpose of exploring the interior country as far as the Russell range, in accordance with instructions to that effect conveyed in your letter to me, dated the 30th of the previous month. Those instructions, I have the satisfaction to add, have been fully carried out. The expedition examined and passed round the range, and returned to Cape Riche, in 86 days, with the loss only of one horse, although more than once threatened with the loss of all by the dreadful nature of the country they had to force through on the eastern route. The nature of our proceedings will, however, be better understood by the following brief outline from my journal, and by the accompanying tracing of the route which the expedition followed. My letter of October 12th, from Cape Riche, will have made you acquainted with our movements up to that date. On the 14th of the same month, having rested those of our horses that required it, supplied ourselves with materials for light calico and dungaree tents, instead of the heavier ones we had brought from Perth, and discarded every article we could possibly dispense with, we took leave of our hospitable friends, Mr. and Mrs. Cheyne, and started from Cape Riche with 90 days' supplies for six persons, and 300lbs. of corn for the horses; the whole to be carried by our 11 horses, which were to complete their bait at the first well-grassed spot which appeared suited for the purpose. Such a place presented itself on the 15th at Yūnganup on the Pāllinup river, and we remained there until the morning of the 18th, completing our preparations. It is in latitude $34^{\circ} 24' 6''$ S., 15 miles N. by E. from Mr. Cheyne's farm, and has a limited quantity of excellent grass in a small valley tributary to the Pāllinup, which was here slightly brackish, in long deep pools, 80 or 90 yards across, abounding with black swans, ducks, and teal. While at the camp, a Cape Riche native, known as "Bob," who had engaged to form one of our party to the E., was visited by several of his

friends from Doubtful Island Bay, and other parts, including two who had walked with him from what he represented to be the neighbourhood of Middle Island; but as I could gather nothing more as to the nature of the interior country than Bob himself was able to communicate, I did not regret my inability to engage the proffered services of one of the two who offered to accompany me also, and who had previously accompanied Mr. Bland and Dr. von Sommer to the neighbourhood of Mount Barren.

Dispatching by them to Cape Riche our final letters for the Swan, with a suitable inducement to insure a safe delivery, we began on the evening of the 18th to ascend the Pallinup, in the hope and belief it would lead us to the N.E. In 7 miles we quitted the main river, coming in long open reaches from the westward, between grassy banks, and ascended a branch coming from the N.E., where we soon found ourselves amidst the white and red sandstone cliffs of the coal formation, and continued so for the next 6 miles, when we encamped just in time to escape the severity of heavy stormy weather, which set in from the N.W. with much rain. This continued and detained us in camp during next day, a respite which was to myself personally acceptable, as I had caught a violent cold by incautiously sleeping in wet clothes. Whilst ascending this river we carefully examined every accessible cliff for coal shales, but could discover no approach to them, the strata in this place being apparently too remote, and having no perceptible or decided dip in any direction.

Finding we were led too far N.W. by following up this branch, we quitted it on the 21st, 13 miles further N., coming from the N.N.W. through a valley of good soil and grass, 300 yards wide, with scrub on each side; the channel being filled with granite and whinstone, and the water high coloured, but brackish. Kangaroo and emu numerous.

Steering N.E., we crossed several small fresh streams running to the S., in good grassy valleys, and at noon, in lat. $34^{\circ} 4' S.$, came on one of large size, in a more considerable valley of good soil, well grassed. It was running from N.N.W., rather brackish, and, according to our native companion, flows into Bremer Bay, 45 miles to the S.E. I did not therefore follow it, leaving its further examination for my return W., should circumstances then permit.

We had now decidedly left all indications of the coal formation behind us, and were in a granite and quartz country of greater elevation, sheets of the former spreading out on the surface, and the latter blended with it. Pushing to the N.E. we crossed several fresh tributaries of the above river, occupying good grassy valleys, and encamped 10 miles further on, upon a N. branch of the same river, fresh, in a grassy valley of good brown soil,

timbered with yeit, casuarina, and wattles. The former is a species of the extensive eucalyptus family, with a dark rough netted bark, and is always welcomed by the traveller as growing in good soil, and amongst grass.

On passing over the first ridge on the following morning we were gladdened by the view of a large tract of good grassy country to the N.E., lightly timbered, and at this time well watered by a river and its numerous branches. It is known to the natives as Jeër-a-mung-up. Entering upon it immediately, we descended for $2\frac{1}{2}$ miles by a well-grassed valley, with beautiful lightly-wooded hills or slopes on either hand, and then reached the main river, slightly brackish, in a granite rocky bed, and scarcely running to the S.E. Grasses of the best description filled its valley, and extended up the sides and over the tops of the gently rising hills on each side, which, as well as the valleys, were lightly wooded with yeit, casuarina, and black wattles. Finding from Bob that this stream flowed S.E. to the sea, near Middle Mount Barren, I left the lower part of it for future examination, and traced upwards to the N.E. by E. amongst rich grass and soil for 3 miles, when, finding the grassy breadth decrease, and the river coming from the N.N.W., I proceeded up a branch in a N.N.E. direction, and near the junction observed the latitude at noon to be $33^{\circ} 54' 52''$ S. Samphire and rushes filled the bed of the stream, indicating a want of permanency in the good water. This being Sunday, we encamped at one o'clock for the remainder of the day, well satisfied at having seen between 12,000 and 15,000 acres of excellent grazing country during the late $7\frac{1}{2}$ miles of our journey, with a prospect of its being much more extensive, especially downwards. Our native, who has crossed this river near its mouth, reports the land there to be good, which leaves room for a just inference that the intervening space of 35 or 40 miles may be the same.

On the 23rd, I followed this branch upwards to the E.N.E. for 4 miles further, when the grass and water had gradually diminished, so as to render its further examination of little importance, and I again steered N.E., a cloudy observation at noon giving the latitude about $33^{\circ} 53\frac{1}{2}'$ S., and a high hill about Mount Barren, bearing N. 104° E., 45 or 50 miles distant. The country, as we proceeded, was poor and scrubby, with some exceptions, and we encamped late on a chain of salt and brackish pools, dipping E. in a country almost level.

Following these pools down next day, they soon joined a continuous river of brackish water, between banks of granite or sand 20 to 30 yards apart, coming from the N.N.W., and flowing E. and S.E. through open scrubby plains; joining the river of the 22nd many miles lower down, according to the information of our

native. The weather, which had been very threatening during the morning, drove us to an encampment earlier than usual, for after two hours' rain the country was scarcely passable for the horses.

Almost continuous rain from the S.E. quarter fell during the remainder of this day, and on the 25th, frequently bogging our horses in the hollow places while seeking their food. I did not therefore attempt to break up the camp until the following morning, when the wind had veered round to the S.W. and the rain ceased. We then resumed our N.E. route, passing over for the most part open sandy downs, or plains, separated by very dense thickets, through which the axe was in frequent requisition to clear a way for the horses. The country was high and level, water-courses had disappeared, and their place had been supplied by numerous small salt or samphire lagoons; upon one of the former of which we were obliged to encamp, with nothing but long coarse rushes for the horses, and brackish water, which oozed into our wells. Water was, however, speedily supplied in abundance by a most severe thunder-storm, which seemed to vent its whole fury in the very midst of our little party, the lightning darting through and amongst our tents in fearful flashes, and the frequent deafening thunder-claps threatening the destruction of everything around.

On the 27th the salt lakes and swamps increased in number and size as we proceeded N.E.; but after 4 miles they ceased, and our route lay up a long ascent to a country of much greater elevation, but of poor quality, covered with scrub and dense thickets, without timber. Thick showers following each other in rapid succession greatly confined our view, but the surrounding country for at least 2 or 3 miles appeared to be of the same description. While despairing of being able to feed our horses better than the night before we unexpectedly came on a small fresh lake, surrounded by good grass in a clump of trees, and gladly encamped there at once, having come upwards of 16 miles since the morning without seeing either grass or water, notwithstanding the rain, which had fallen nearly all day.

At 2 miles N.E. from our camp we were gratified at coming upon some good grass and a deposit of rain-water in a clump of yait trees, and in observing the appearance of a small grassy granite hill to the N. of our route;—circumstances in themselves very trivial and unimportant in a general point of view, but to us all-important, as giving promise that their recurrence would afford us the means of sustaining our horses. We, however, encountered nothing but scrub and thicket for the next 14 miles, when we were again fortunate in discovering, amongst the many places examined, some good grass and a native well in a clump of yait, where we immediately encamped.

By two stars on the meridian the latitude of this place was $32^{\circ} 23' 6''$ S. I should gladly have set apart the next day (Sunday, 29th October) as a day of rest for many reasons, including that of drying our provisions, which had become very wet on their passage, during the last 3 or 4 days, through the rain and wet bushes: but independently of the small patch of good grass immediately round our camp having been all eaten close off, the weather continued too unsettled to hold out a prospect of my being able to accomplish the desired object effectually, I therefore moved on N.E. in the morning, and at the end of $2\frac{1}{2}$ miles had an extensive view from the summit of a sandy plain of the country in advance between N. by W. and N.E. by E. We were, however, neither gratified nor encouraged by observing that, to the distance of 16 or 18 miles, which limited our view, the country appeared of the same description as that just passed over, the extensive undulating plains being occasionally diversified by dark lines of vegetation, probably only marking the thickets which separated them. At 2 miles further N.E. we came in sight of some extensive white sandy lakes 5 or 6 miles to the N.W., evidently salt, as also of a lofty red granite hill at the same distance, bearing N. 80° E. Despatching Messrs. Ridley and Gregory to ascertain the nature of the lakes, I conducted the party to the granite hill, which I had the pleasure to name Mount Madden, in compliment to my friend the Colonial Secretary of Western Australia, who had taken a warm interest in the expedition. On my way I passed several large granite sheets, with only short mossy grass about them, but abundance of rain-water collected in the cavities, and in some places forming small running streams, the result, probably, of the recent rains. A clear open lake, 3 miles in length, was left a mile to the N., soon after which we crossed over, with considerable difficulty, a broad wooded flat of 3 miles in width, evidently connected with its waters during very wet seasons, but now dry and much encumbered with dead trees and brushwood, both erect and prostrate. A long and very fatiguing ascent of $1\frac{1}{4}$ mile, through close thickets or soft boggy land, brought us at length to the base of the granite mass, where our disappointment was great at finding only sufficient grass to give our horses a scanty feed during the night. Messrs. Ridley and Gregory rejoined us soon afterwards, having traced the salt lakes and their connecting channels downwards to the one I had passed near, and found the country about them scrubby and worthless. Ascending Mount Madden, we found it a mass of solid red granite, $\frac{1}{2}$ mile in length, and from its summit caught a view of East Mount Barren, bearing N. $172^{\circ} 15'$ E., nearly 50 miles distant, and again saw an intermediate range, apparently granite, which we had first observed in the evening. Its summit was now 15

miles distant in the S.E., and received the name of Mount Short in honour of the Bishop of South and Western Australia, who was expected at that time to be making his first pastoral visit to Perth. The country around our station did not present any very encouraging appearance, the principal objects visible being sand plains and thickets. The latitude of our camp was $33^{\circ} 18' 14''$ S. On the 30th we pushed on to the N.E. 12 miles, over sand plains and through much close thicket, including the stubborn burnt sticks of last year 6 to 8 feet high, which much impeded our progress, and tore our clothes and packs. After searching many clumps of trees in vain, we at length found good rain-water and excellent grass among some burnt thicket, and encamped for the night.

Towards sunset of next day, after a fatiguing march of 23 miles through much thick country partially wooded, we were again greatly favoured by coming most opportunely to a small shallow lake, the water in which, although highly coloured by the clay bed, was quite fresh. A little grass being scattered along the margin, we encamped for the night. The latitude by two stars $32^{\circ} 55' 20''$ S. On quitting this lake we entered immediately on a low level bed connected with it, and trending to the E., about 600 yards in width, its well-defined banks being evidently water-worn and flanked by thickets and dense scrub. Our hopes of a river were, however, disappointed, for at the end of 1 mile the unimportance of this channel was evident, and we quitted it, while it took a S.E. and S. direction towards some extensive salt lakes, which we afterwards saw within 20 miles of the spot. Red and white sandstone cliffs, 15 feet in height, were here seen and examined, but no dip or inclination could be perceived in them, nor did they again appear as we proceeded N.E. Our distance at this time of 80 miles from the sea-coast, with a very intricate country intervening, would have rendered coal itself of little value, had that mineral appeared.

On extricating ourselves from the thick country in this neighbourhood, and rising the open sand plains beyond, we obtained the first glimpse of a lofty bare granite peak 45 miles to the E., appearing over the intervening scrubby wooded land like the top of a huge sugar-loaf. A range of wooded hills of less elevation was also seen 25 miles in the N.E., and to them we first bent our way, as lying nearer our intended route; but the further we advanced the worse became the country, the scrubs and thickets were more dense, the sandy soil more stony, appearances of grass less promising, and after a fatiguing march of 18 miles, there was nothing better for our horses than coarse rushes and scrub, without water.

Early the next day, November 2nd, we proceeded in our N.E. course, and in 8 miles came upon an extensive series of salt lakes

and broad shallow channels, at least $2\frac{1}{2}$ miles in width, studded with many low rushy islands, and winding towards the hills we had seen the day before in the N.E. On one of these islands I halted our hungry horses for $\frac{1}{2}$ an hour, to give them the benefit of some grass there, which, although dry, was very acceptable, and we plied our spade in vain in the most likely places around for fresh water. All, however, was salt: the whole country for several miles seemed one extensive salt basin or low depressed plain, and to afford no chance of our finding in it the article we stood so much in need of. As the day advanced I quitted this salt region, and on keeping more E. came on good grass in several situations, but could not halt upon it for want of water,—our last chance was the range of hills for which we had been steering—one of those we accordingly ascended, passed several channels, quite dry, and were greatly disappointed on reaching the summit, after sunset, to find it a collection of loose quartz and whinstone, instead of granite sheets retaining water. Forcing our way at once towards a deep valley beyond, the darkness and almost impracticable thicket soon obliged us to halt, and we tied our horses up short in a small clear space, without a blade or drop of anything to give them. We were ourselves much better off, having a pint of water each, the last remains of our scanty stock. Markab, on the meridian, showed the latitude of this bivouac to be $32^{\circ} 37' 11''$ S., or about 90 miles from the nearest part of the coast to the southward. Being now fairly within the range, we could perceive it consisted of a succession of steep narrow ridges of unequal elevation, covered densely with thickets and small timber, and yielding no grass. The soil was coloured a deep red by the ironstone at the surface, but the principal rock in view was whinstone, with fragments of quartz. This description seemed to apply to the whole of the range, which apparently extended N.W. and S.E. about 6 miles, with a width of about 3 or 4; but our view was very much confined by the thickness of the wood, and I had to regret being unable to catch even a slight glance at the country we had passed over, as the setting sun was gleaming like burnished gold upon some open water to the W. of our recent route, and would probably have pointed out an extensive continuation of the salt lakes we had encountered during the day. In remembrance of an excellent officer, under whom I had formerly served in the navy, I named this the Bremer Range, and its highest hill Mount Gordon.

Our horses having now been two days without water, and eating but sparingly for want of it, I became anxious to obtain a supply for them, and fortunately succeeded next morning by digging in a small water-course we had followed down to the eastward. Here their pressing thirst was in a slight degree alleviated by $\frac{1}{2}$ a bucket

each of a red liquid, which was, nevertheless, fresh, and before the heat of the day came on we fortunately found an abundant supply of good water, in small pools in the midst of thickets and scrub, where little expected. The rush of the poor horses to it was so sudden and uncontrollable that they were all in the midst of the pool in an instant; and two of them carrying heavy loads were with difficulty unloaded and got out again. By this time we had passed to the S. side of the range, and found a continuation of the fresh pools in a water-course which descended from its south-eastern slopes; there was, however, a total absence of grass at this time, although there was reason to believe some good grass had covered the hill-sides previous to the last fires, which had swept all minor vegetation away, and left standing only that close thicket and scrub we heartily wished had shared the same fate.

Food for our half-famished horses being now the first consideration, and there appearing little prospect of obtaining it on a more northerly route, or of procuring fresh water in the great salt valley to the S., I steered E.S.E. across tolerably open sand-plains, towards the high granite peak we had seen on the 1st, which was 28 miles distant in the S.E. Anxiously did we watch the progress we made towards the desired haven, doubting not its being able to afford us the means of giving the party a couple of days' rest, of which all the horses were sadly in need. All our anxiety and exertions, however, could not accomplish our wishes; the famished and exhausted animals, after a fatiguing journey of nearly 24 miles to sunset, were unable to proceed any further up a continued ascent, and we were compelled once more to halt them for the night amidst coarse rushes and scrub, and without any water, their existence appearing to depend on our finding both water and grass on the morrow.

Algenib on the meridian gave the lat. $32^{\circ} 52' 43''$ S., and our distance from the granite peak was still 3 long up-hill miles.

Commencing their ascent early next morning, the hill itself was eventually reached, but all search for the means of keeping our cattle alive was for a time fruitless. Both grass and water were, however, found on the northern side; and there the party encamped in the afternoon. I found it absolutely necessary to remain here a few days for the recovery of the horses, several of whom were so weak as to be scarcely able to stagger along with their loads, or to be got on their legs again after falling. This respite also enabled us to examine and dry the provisions and stores, repair saddlery and clothes, and put in order our saddlebags, which the recent thickets had almost reduced to shreds. A short rest was also acceptable to the whole party. This welcome retreat being at the most elevated and prominent

mass of land we had hitherto discovered on our journey, I named the whole the Fitzgerald Peaks, the highest being distinguished as Peak Charles, and another of proportionate elevation as Peak Eleanor. The former is about 1000 feet above the surrounding plains, and has some excellent grass on its eastern base. The view from this peak, although very extensive, was by no means cheering. In every direction lay spread out one vast sea of dark scrub and thicket, intersected by broad belts of salt lakes and samphire marshes, to the visible extent of 30 miles, and doubtless more, winding through a country apparently almost level; the only exceptions being the wooded range we had last quitted 35 miles to the N.W., and another range of similar appearance somewhat farther off in the N.E. quarter. To the latter I felt most desirous of proceeding next; but when I contemplated its apparent character through a telescope, and glanced over the intermediate country, a recollection that my horses had been 5 days without grass before they reached Peak Charles, forbade me to compromise their safety, and thereby to endanger the results of the expedition by making the attempt. Having therefore sufficiently recruited them all, with only one exception, and refitted our shattered equipments, we launched out once more on the morning of the 9th of November, into the frowning sea of scrub to the eastward, and soon came, as expected, upon country which had not belied its appearance.

It may be sufficient merely to add that, after struggling with this formidable country for 3 days, and by forced marches accomplishing a distance of 50 miles E. from Peak Charles, the expedition became almost entangled in a very extensive series of salt lakes and marshes, one false move amongst which would have proved its entire destruction. We had, however, fortunately come upon a patch of good grass for the horses in the midst of this universal waste, but they were sadly distressed for water, which had only once been met with since leaving Peak Charles. At this critical juncture it was found impossible to continue the exploration further eastward until they could be recruited. For this purpose, therefore, I began next day to work my way to the S., in hopes of speedily emerging from the extensive salt country in which we had hitherto encountered so many obstacles. No improvement, however, took place for the next 12½ miles, at the end of which we looked out upon a country of much less elevation to the southward, and with great thankfulness welcomed the sight of a considerable elevation to the S.E., which formed the only break in the uniformly level horizon. It is scarcely necessary to say that we instinctively turned towards this promising relief, but as I looked across the intervening distance of apparently 30 miles, and at the same time contemplated the distress and exhaustion of our cattle, I confess the

result appeared doubtful. We had not proceeded on our S.E. course more than 8 miles before the horse for which I had most cause to fear was knocked completely up, and unable to move another step. As he had only previously carried an empty saddle it was speedily removed to another, and to our great regret poor "Jack" was abandoned for the present, in the hope that we might yet find both water and grass within reasonable distance, and be able to recover him. Three miles further on, another of my best horses (Ney) also gave in, completely beat, and the rest were in a most pitiable condition, for we had been totally unable to restrain them from rushing into the salt lakes near which we passed, and from drinking part of their contents before discovering their briny quality. To avoid these lakes was impossible, the country being so thick that they were not seen until a few yards distant. As the sun was now near the horizon, and I was extremely unwilling to lose this second horse without some further effort for his recovery, the party were encamped on the spot, after a most trying day's journey of more than 23 miles, but once more without either grass or water. A kind Providence, however, which had already relieved us in many a difficulty, again interposed in our behalf, and by means of a light rain, which fell for 2 hours during the early part of the night, enabled us to collect with our tin plates, from the surrounding bushes, sufficient water to give the two weakest horses $1\frac{1}{2}$ gallons each, and the remainder a quart a-piece. This proved most welcome and seasonable after having been 3 days and nights without a drop of anything but brine. We were also enabled to replenish our own small stock. This day we passed over, in lat. $33^{\circ} 8' S.$, long. $121^{\circ} 52' E.$, the dry beds of several salt lakes formed of the white and dark red sandstones belonging to the coal formation. They were very mottled and confusedly mixed, and had numerous veins of hard ironstone running through them, similar in appearance to the sandstone, which we afterwards saw in close connection with coal and shales.

Striking our light dungaree tents at 3 o'clock next morning (Nov. 13), we got away early on our S.E. route, the horses appearing somewhat revived; but their frequent falling and stumbling betrayed their extreme weakness, and at the end of 4 miles Ney, from utter inability to proceed, was again left behind. With many regrets he was here left, and we pushed on, the day becoming very warm and oppressive. Every obstacle was, however, finally overcome, and at 3 o'clock I had the satisfaction to encamp the party once more in a desirable spot, at the east end of the hill for which we had been steering, and to which I gave the name of Mount Ridley, after one of my companions, to whom I felt greatly indebted for his prompt and valuable aid on all occasions which required it. Indeed the whole party were actuated by the best

spirit, and I need not say it was fully taxed in meeting all their privations and difficulties. Next day Messrs. Ridley and Gregory, with the native Bob, brought Ney once more into camp, but in such an exhausted condition as to render another day's halt necessary for his partial recovery. I regretted this the more as the grass around Mount Ridley was scanty and poor, and I hoped to obtain it of much better quality at some other hills of similar character, which appeared at the distance of 25 to 40 miles further eastward. From the summit of the Mount, which is a huge mass of bare granite a quarter of a mile in length, and about 700 feet above the surrounding plains, several hills of similar description were visible to the southward and eastward, but in every other direction was spread out one illimitable sea of frowning scrub and thicket, with extensive chains of salt and samphire flats and lakes too numerous to particularise, and bounded by a distant horizon as unbroken as that of the sea itself.

Much of our time was now taken up in attending to the horses' backs and sides, which were sadly galled by their saddles. The leather and canvas of their appointments were also bad, and required constant repairs, which were rapidly consuming the small quantity of materials we had taken with us for the purpose.

Having, by the evening of the 15th, completed all pressing repairs, and weeded our baggage of every article that could possibly be dispensed with, we again pushed forward to the eastward early next morning, Ney with only an empty saddle. His powers of endurance had however been over estimated, for at the end of 15 miles they again failed, and he could move no further. Giving him a portion of the water we carried, Messrs. Ridley and Gregory's offer to remain and bring him on after us was accepted, and I made for the nearest granite hill, which was then 9 miles distant to the S.E., rising like all the others out of extensive level flats of salt lakes and thickets. With a star for our guide we groped our way after dark through the thick brushwood, and finally reached the hill at 9 o'clock, turning the tired horses loose to find the best feed they could. Water we had already passed through, in thick tea-tree swamps, nearly up to their knees, and next morning an excellent spring well was found at the eastern foot of the hill, amongst luxuriant grasses of the best description. Thither we immediately removed from the rocky unsheltered bivouac we had been compelled to take up for the previous night, and soon afterwards the absentees returned, having been unable to bring on Ney nearer than 4 miles: at noon the attempt was renewed, aided by our two water-kegs and a bag of good grass; but when night closed in the poor animal was still a quarter of a mile from the camp, utterly unable to move another step, and it was not until next morning that he could be brought in. As both grass and water

were abundant at this limited spot, I determined on leaving him here to have a chance of recovering from his exhaustion, and of being called for again on our return homewards by a more southerly route. I could scarcely bring myself to regret the delay of a day thus caused, as the horses were greatly benefited by being in such good quarters; numerous repairs were again made to our torn saddle-bags, and I was afforded an opportunity of obtaining an extensive round of angles to a numerous assemblage of distant granite hills which covered the horizon between E. and S.W. The most interesting of these to us was the Russell Range, which now for the first time came in sight 50 miles to the eastward, in lofty and rugged outline, cheering us with a far-off prospect of the eastern limit of the country I had been instructed to examine.

Although so near, however, there was no mistaking the nature of the intervening country, which was desolate and cheerless in the extreme, presenting no more friendly granite hills at which we could hope to keep our horses alive, and even the misty range itself caused many a doubt in my mind as to the nature of so huge a mass of rock, rising abruptly out of a sea of scrub. The whole northern horizon between this range and Mount Ridley was unbroken by a single hill, to the distance of 30 to 40 miles, and was covered with salt lakes and dense scrub on a gradual northerly ascent. Here, on the evening of the 17th, we viewed with peculiar interest, from our elevated position of 400 feet above the surrounding plains, a lengthened exhibition of the mysterious southern lights which, for more than an hour, darted or flashed upwards in rapid succession to the height of 20 degrees above the horizon, through a reddish glare, resembling the loom of a distant conflagration, but which was in all probability caused by the extreme haziness of the atmosphere.

The huge mass of granite, 200 feet above our camp, which had thus so opportunely afforded a refuge to our favourite horse, having been named after him Mount Ney, we suspended his saddle in a tree, and once more launched forth eastward into the formidable country before us, relying on a continuance of that aid and protection which had hitherto been so conspicuously extended towards us. Nor had we overrated the nature of the obstacles which now opposed our progress. At first we were flattered into hope by some relaxation in the density of the scrub, but as we persevered on our way towards a small granite hill where I hoped to obtain grass and water, numerous salt lakes again obtruded their unwelcome presence, bound and joined by thickets so close and densely matted together, as frequently to call our axes into requisition before the horses could move on. This belt of salt and scrub, 5 or 6 miles wide, which occupied the lowest part of a valley

trending to E. by S., being passed, and a passage forced through the close thickets which covered the opposite ascent, our poor horses could do no more, and were gladly conducted at the end of 15½ miles to their promised rest and feed. Here, however, not a blade of grass rewarded our minutest search, and only a few pints of water were lodged in holes in the rock. Some flags and coarse rushes occupied the place of better feed, and among these the horses were tethered to do their best, water being fortunately found by digging near the N.E. foot of the granite rock.

Quitting this inhospitable retreat as early as possible next morning (Nov. 19), we again steered E. through thicket and scrub growing in light soil, and at the end of 6½ miles came suddenly upon a small fire which had just been abandoned by some natives. The embers were under my feet before they were discovered, and the country was so thick that I did not immediately perceive near them several long bark baskets, tied up at the extremities, and filled with honey-flowers, which the natives had been employed in collecting. Their retreat was so hasty that they had even left behind two carved and well-greased "wommerras," used in discharging their spears, nor could they be induced, by the loud calls and invitations of our native, to return and give us an interview. We therefore placed some biscuit in their baskets, left everything as we found it, and proceeded on our way; Bob being of opinion that they either had taken us for devils and would never venture near the spot again, or that they were concealed at the time within very few yards of it. We had on several occasions reason to suppose that the natives were aware of our vicinity as we passed through the country, and were even watching our movements; but we saw none of them at this time, nor could we succeed on other occasions in bringing on any interview, although we purposely passed over tracts of country in which their fires were burning. On such occasions we saw footmarks on the sand of men, women, and children, though not of numerous tribes, and observed their signal smokes rise suddenly up within a mile and a half of us soon after we had passed.

Although the country still continued to be densely thicketed, it lost its generally flat character, and raised our hopes of a change,—for fresh water had lodged in no less than three places met with this day, showing the more clayey nature of the soil; the salt lakes seemed to have been left behind, and a gradual rise was perceptible in the undulations, which on their ridges had an outcrop of granite. A change for the worse appeared however in the scrubs, which became even more close than before, and contained considerable quantities of a broad-leaved stubborn eucalyptus, that would not readily yield a passage. At sunset we encamped once more without grass or water, but our hungry horses consumed the bark

off every tree, and the top off every bush within their reach, some of them even eating the dry sticks under their feet.

Early on the next day's march we were fortunate enough to fall in with a small pool of fresh water, and 6 miles further on our famished animals were revelling in a beautiful patch of excellent though somewhat dry grass, growing amongst yeit-trees in a circular flat 300 yards in diameter, having found nothing better than flags and rushes at the low granite hill for which we had been steering for the last 21 miles. We hailed this additional change in the features of the country with much satisfaction, good grass being invariably found amongst the yeit, in a better description of soil. Although the day was yet young I felt compelled to encamp here for the sake of the horses, several of whom had fallen during the morning from absolute weakness. From one of these, who had thus fallen, and had staked himself badly in his ineffectual struggles to rise, a rough piece of dead wood was extracted $4\frac{1}{2}$ inches long and three-fourths of an inch in diameter.

Amongst the changes perceptible hereabouts we observed a greater variety than heretofore in the nature and qualities of the soil, which, from a general light sandy character amongst the salt lakes and samphire marshes, had now become more clayey and loamy, and altogether of a better description. It was also satisfactory to find we were traversing a country capable of retaining fresh water at its surface, for so little rain had fallen of late that we found the granite rocks were no longer to be so fully relied on as formerly for those supplies, which we had hitherto chiefly expected to procure from them. As we advanced eastward next day the country was found more undulating, and occasionally broken into large granite sheets, round one of which near our last camp was some good grass, but the general surface continued densely thick, and sorely tried our weary and exhausted animals, for whom I greatly wished to procure a few days' rest and good feed. At the end of 13 miles they could go no further, and I was compelled to halt them once more in the tall scrub, with nothing better than rushes, and without any water; nor did we prove successful in procuring any of the latter by digging. Climbing a granite ridge immediately over our camp, I looked out with much anxiety over the desolate space of not more than 20 miles, which still lay between us and Russell Range, and turned over in my mind a list, far too long, of those horses which I feared would never have strength to reach it. Granite hills were abundant to the southward, within the same distance, but I cared nothing for them at the time, and to the N. the interminable frowning scrubs presented an aspect anything but cheering. The only relief appeared in a small granite hill 16 long miles to the E., and as it was in the direction of our intended route, I launched out for it early next morning, relying

on a kind Providence, and the unsubdued spirit and energy of my little party, for aid. The poor horses staggered up to their saddles with a despondency and aspect which seemed to upbraid us with their treatment, and I felt glad to escape from the misgivings which their appearance created by commencing the toils of the journey. I should most gladly have reconnoitred in advance on such occasions, but in so fearful a country delays were utterly inadmissible, and to have halted the party would have been certain destruction to the whole. Thus were we hurried on from day to day, without its being possible to give the wearied horses that rest which was almost indispensable to their very existence.

Travelling now became difficult in the extreme. To avoid sapling thickets, 12 to 15 feet high, so closely packed that axes only could have opened a passage, we were compelled to take a more circuitous route round them, and to force a way through scrubs of a more yielding character. These were frequently so dense that at the distance of 3 or 4 feet no part of a horse could be seen, and the greatest care and watchfulness were necessary to keep them close together and in line. This work, however, could not last long; and when half way to the granite hill, four of the horses gave convincing proofs of their inability to proceed another mile, by streaming out in those profuse cold sweats which are always the forerunner of a complete and fatal break up. Thankful for the warning, the party was halted, the complaining horses unloaded, and arrangements immediately made for leaving behind everything that could possibly be dispensed with, including the whole of our salt meat, which had formed the entire load of one horse; but it was no easy matter to decide what in our situation could best be abandoned, our equipment being as light as possible, and without a single article that could in any view be deemed superfluous. Some little time was necessarily occupied in completing these arrangements; and our salt meat was about to be triced up to the trees destined to receive it, when the horses appeared so much revived by their short respite that I resolved to make one more trial to get on without the adoption of measures which might materially cripple the ultimate proceedings of the expedition. Distributing the loads, therefore, in proportion to the ability to carry weight, and every horse carrying a pack, we cheered them on as well as we could; kept them all moving and in close line; and late in the afternoon halted at the foot of the hill where we had hoped to obtain relief. Here, however, we again met with nothing but cruel disappointment,—not a blade of grass was to be found either over or around the hill; and a flattering appearance of water proved to be a mere trickling over a large bare granite sheet, scarcely sufficient to wet its surface. Encamping among some rushes and scrub at this spot, in the vain

hope of procuring water with our spade, the horses were suffered to roam about the hill, and pick up what they could find, while I climbed to its summit for a view of the surrounding country. Cheerless, indeed, was that view, and serious were the apprehensions forced upon me for the safety of the whole of the horses, in whose existence was likewise involved that of the party placed under my charge. At the distance of only four miles, the precipitous mass of rock composing the Russell Range rose abruptly, in a bare naked mass, to the height of 600 feet out of the surrounding scrubby plains, and not a blade of grass or the least appearance of fresh water was anywhere to be seen. Thickets and scrub, interspersed with sand-plains and salt-lakes, covered the face of the country, except where numerous granite hills disturbed the uniformity of the southern horizon, like so many bare rocky islands rising abruptly out of the sea. We had observed natives' smokes rising up about this spot from a distance, or I should now have left all our heaviest articles and hastened our dying horses on until I found both food and water for them; but not caring to run so great a risk of losing our provisions, and feeling that one false move in our critical situation would compromise the safety of the whole party, the last of the small quantity of water we had carried was shared out for breakfast; and early on the morning of the 23rd the party was moving on to ascertain the worst.

Making for the nearest part of the range, the bush became fortunately more open, and freely admitted the passage of our exhausted and desponding animals, who staggered along under their loads as if it were the last effort they could make. Our greatest present anxiety was to keep them from falling or lying down; as, when once down, they were with great difficulty got on their legs again. Finding, on a nearer approach to the range, that we had not been deceived as to its utter sterility on this side, we hastened towards a clump of yelt and casuarina trees at the S. end, and there, to our great joy, found abundance of excellent grass in a small thickly-wooded ravine, the bottom of which was occupied by a small rocky water-course. Here the party were immediately encamped: the horses required no bidding to feed after their long abstinence; and while one party was dispatched round the E. side of the range in search of water, another plied the spade in those spots giving most promise of it. Leaving one man to keep the camp, I then followed up the water-course in the ravine. This, however, proved most unprofitable; and after much scrambling and climbing was found to issue from a small deep cavern in the mountain, so defended by thicket and tangle as to be scarcely approachable. It was quite dry, and the spade produced lower down only a very small quantity of brackish

water, of a yellow colour. That water was somewhere in the neighbourhood there appeared little doubt, by several natives' fires having started up at little more than a mile from us; and we were discussing a plan for beating up their quarters when Lee and Bob returned from their excursion round the range with the joyful news that they had found a splendid run of excellent water near its N.E. extremity, with grass in the same neighbourhood. Reloading, we lost no time in proceeding to the spot; and I had once more the gratification of encamping in a situation where the horses could recruit their exhausted energies, and prepare for the remainder of their journey. No sight could have been more welcome to us at the moment than this beautiful run of pure cool fresh water, cascading down from the highest part of the range immediately above, and forming various lodgments in small clear pools, in which several of the poor horses immersed nearly their entire heads.

Although the feed hereabouts was neither first rate nor abundant, I felt it necessary to remain 4 days to recruit and refit, and had the satisfaction to find our stud improve rapidly in spirit, although not much in appearance. The rest was of most essential service, not only to their weary limbs but to their sore backs, in the constant attention to which neither time nor labour was spared.

Every effort was made to remedy the defects in our pony pack-saddles, to make them fit better; but we could effect little real good in this respect beyond fresh arranging their padding. Our saddle-bags were also in so dilapidated a state, that we were almost at our wits' ends for devising the means of making them hold together.

While these operations were in progress I lost no opportunity of collecting materials for my survey of the country, adding to the collections of geology, botany, &c., and making as many astronomical observations as our limited stay and the state of the heavens would permit.

The result of the latter showed that by four different stars a lofty flat-topped peak near the N.E. end of the range under which we had encamped was in latitude $33^{\circ} 27' 15''$ S., and longitude by chart $123^{\circ} 24'$ E.; the variation of the magnetic needle by means of 9 azimuths being $2^{\circ} 46'$ W.

On ascending the peak this section of the range was found to consist of a sharp narrow ridge of rugged steep rocks, about 14 miles in length, N. by E. and S. by W., with sides rising in many parts at an angle of less than 45° to the summit. Having seen no peak that better deserves the name, I conclude this to be the hill which Mr. Eyre, the discoverer of the Russell Range from the coast, called Mount Ragged. It is a somewhat loose mass of

laminated quartz and micaceous schist, dipping to the W. by N., at an angle of 7° or 8° from the vertical, and intersected by numerous quartz veins traversing the mount in various directions. The summit is about 600 feet above the base; and the latter 400 feet above the level of the surrounding limestone plains. Several remarkable transverse rents are also observable, extending from the summit to its base, and combining with other appearances to lead to a belief that the whole mass is rapidly breaking up. The other hills of this range are of similar aspect and composition, but are of less elevation, and lie in a detached group, 4 or 5 miles to the N.E.; the intermediate and surrounding country being covered as before with thickets and scrub, presenting a horizon 30 miles distant, in the N.E. and N.W. quarters unbroken by a single rise. In the opposite quarter appeared the mighty ocean, studded with many islands of the Recherche Archipelago, and numerous reefs, both covered and dry. The low sandy coast about Point Malcolm seemed to be not more than 15 miles distant in the S.E.; and numerous fires of the natives smoked up amongst its sand-hills, and along the coast farther to the N.E.; behind which rose some granite hills of considerable elevation, similar to those which now appeared in view behind Capes Pasley and Arid. Amongst them I directed my glass long and attentively, but in vain, in the hope of discovering some inducement for prolonging my journey to the eastward; for although I had then the satisfaction of standing upon the spot pointed out in my instructions as the eastern limit for present exploration, I should not have hesitated to exercise a discretion in proceeding farther E., had appearances and prospects in the least encouraged an advance. Such, however, was unfortunately not the case; not the least sign of a grassy tract of country appeared in any direction, and our horses had already had too much taken out of them to warrant my further risking their lives, by prolonging the examination of so fearful and impracticable a country. They had already traversed fully 1000 miles of country since leaving the Swan River, and had as much more in prospect before they could reach it again.

From this point, therefore, I determined on returning to Cape Riche by a more southerly route, for the purpose of intercepting and examining any rivers or streams that might fall into the S. coast.

On the 28th November, the horses having been sufficiently recruited, and all practicable repairs effected in our clothes and appointments, we commenced our return, passing from one to another of various hills composed of granite and gneiss, which we had noticed from the interior, and generally finding around them sufficient grass and water for our purposes. Grass trees and

zamia were again met with at less than 20 miles from the Russell Range, as also the Kangaroo, which afforded us a welcome relief from our long salt diet.

The soil of the country we now passed over was generally of a light sandy character; but it improved as we proceeded W., and encountered the novelty of numerous open fresh lakes, rushy lagoons, and abundance of fresh water, in a country lying low and level. Clumps of yett trees scattered about it afforded our horses plenty of grass, and we had the satisfaction of seeing them improve daily in spirit and condition; for the country was more open and accessible, and gave us reason to hope all formidable scrubs had been left behind.

Fragments of limestone, of oolitic formation and variegated colours, were in many places abundantly scattered over the surface; and the same rock frequently formed the basis of the low rocky ridges which traversed the level country between the granite hills. The latter were usually bare, naked masses of close solid granite or gneiss, 300 to 500 feet above the surrounding plains, from which a sloping platform ascended for $\frac{1}{2}$ mile to the base of the bare rock. These hills frequently presented the extraordinary appearance of deep yawning rents or fissures, 3 inches to 1 foot in width across their entire breadth, some being open, but the greater part filled up with loose stones and rubbish. The rock itself was too compact and solid to exhibit much dip or stratification; but wherever any such were observable, the dip seemed to be to the S.S.E., at an angle of 20° from the vertical. We found occasion also to observe more than once that the huge masses of rock, of which these hills were composed, had, from some unknown cause, probably subterranean, undergone a complete and violent disruption; and that whilst one end of a mountain mass would be piled up in a confused heap of immense boulders, its opposite extremity would repose in broad smooth sheets of almost unbroken rock. Whether such appearances have been occasioned by subterranean fire or merely exhibit the wreck of once lofty peaks, I feel unable to say; such hills had evidently in former ages been of considerably greater dimensions. Those met with on the eastern part of our journey could never be relied on for affording feed for our horses.

On the 2nd December, having reached a lofty and remarkable granite hill, 50 miles S.W. of the Russell Range, which I named Howick Hill, in reference to the nobleman at the head of colonial affairs, we were then 25 miles abreast of Mount Ney, and I determined on sending for our valued horse, if found alive and able to travel. Accordingly Messrs. Ridley and Gregory, who had volunteered their service, were dispatched to Mount Ney on the two best horses we had, while I conducted the party to

some grass and water which we had passed in a low swamp 3 miles back, the country for many miles round being tolerably level, and covered with very thick prickly scrub, knee high, closely matted, and difficult to get through. Large clumps of *nuytria floribunda* (cabbage-tree), mixed with *melaleuca* (tea-tree), both of stunted and gnarled growth, were now scattered about, and formed the nearest approach to timber we had seen for 350 miles. Stagnant water was plentiful, but grass very scarce, wiry, and coarse. The total failure of even this supply obliged me on the 4th to remove the horses to another and more grassy spot which we had discovered in our rambles, 2 miles farther to the S.W.; and I should gladly have moved the entire camp also, had I not feared our absent companions might thereby miss us altogether, had they travelled after dark to rejoin us. The necessity for shifting our camp was urgent; for, independent of the grass and feed being closely eaten off, one by one of our little water-holes had been dried up, leaving half a bushel of tadpoles, 1 inch long, at the bottom; and our bowels and limbs were affected by the unhealthy low situation. Intending to leave a notice of our position, we were preparing to start from this residence of fever and ague while we had the power to do so, when, to our great joy, the absentees returned late in the day, with Ney in company. His respite of 15 days had improved him wonderfully, though he still gave too abundant evidence of continued weakness; but this, I trusted, some indulgence would overcome. During our stay at the camp the weather was too cloudy to admit of my obtaining any astronomical observations beyond what enabled me to ascertain that the variation was only $0^{\circ} 12'$ westerly. Mosquitoes and large biting flies were exceedingly abundant and troublesome.

On the 5th we gladly moved westward once more, the horses much recruited by the respite they had been afforded, and by the attention we had been enabled to bestow on their sore backs.

No material alteration took place in the face of the country. It continued nearly level, but with slight undulations of low limestone ridges, among which were many small fresh lakes, with occasional clumps of reed, affording good grass and water.

On the 7th we were abreast of Esperance Bay, and encamped at the foot of a high granite hill, 15 miles N. from Cape-le-Grand, from the summit of which a crowd of lofty granite islands and rocks were observed to rise abruptly out of the sea, together with some covered rocks and reefs, which will render great caution necessary, on the part of the vessels frequenting the bay.

The shore of the latter is sandy for several miles back, and numerous lakes, apparently salt, were observed to lie behind its northern beach. Around our camp were many huts and recent

fire-places of the natives; and large smokes were curling up 3 or 4 miles to the westward, showing the country to be somewhat better peopled. This hill, being a very remarkable object at a distance of 40 miles, I named Mount Merivale, after one of the Under Secretaries of State for the Colonies; and a similar hill, 15 miles to the eastward, Mount Hawes. While taking a round of angles from the summit of the former, Mr. Ridley, who was breaking off samples of the rock, discovered in one of very white formation some remarkable veins and streaks of a light blue colour, which led to further examination, and to our quarrying to as great a depth as we could penetrate with the tools in our possession. All our sanguine hopes of copper, however, fell to the ground by finding, on our return to the camp, that the best specimens would not respond to the established tests.

To the W. of Mount Merivale we crossed several streams of brackish water, running in shallow channels, from 1 to 20 yards wide, towards the lakes behind Esperance Bay. These were the first watercourses we had met with for 400 miles; the surface-water of the country, where occurring at all, being found in holes amongst the granite rocks, in small rushy lagoons or open lakes, and occasionally in lodgments in the more clayey descriptions of soil amongst the thick scrub of the interior. In the latter situations were also frequently seen many circular spaces, 5 to 10 yards in diameter, in which the interior rain-waters had subsided, and which answered the description of Dr. Leichhardt's "melon-holes." From this time until we arrived abreast of the western group of the Recherche Archipelago, salt lakes were of frequent occurrence immediately behind the sea-coast hills, and yielded the only food for our horses which this part of the country was likely to afford us; nor was this at all abundant or easily found on the route I pursued. Mr. Eyre had, in 1841, generally found abundance both of water and grass hereabouts for his horses, immediately behind the coast hills; but I was desirous of avoiding all former tracks as much as possible, and, with respect to the nature of the country further inland, some natives we fell in with gave me to understand that nothing was to be met with there but scrub and salt lakes.

On the 10th we had, in search for grass, so worked our way amongst numerous salt and fresh lakes and swamps, and the narrow ridges of steep limestone hills which divided them, that it was not without some difficulty we extricated ourselves next day, and gained the less intricate country which bordered them on the N. The travelling was, however, bad, and very trying to our wearied horses, both on account of the steepness of the ridges, and their rocky rugged nature. We were, therefore, not sorry to find grass increase as we proceeded over more accessible slopes,

and that in one patch it was of excellent quality to the extent of 300 acres. Hopes being raised, toil no longer felt oppressive, and, before noon, we were once more gladdened by the sight of an open deep river, 15 yards wide, extending directly across our course. Clumps of nyctria and yeit were scattered about, zamia of gigantic size grew near the steep banks, and tolerable grass among dwarf grass trees extended back from 2 to 400 yards. Numerous ducks and black swans were constantly disturbed as we ascended the river in its course from the northward, but we found to our regret that the bed rapidly diminished in importance. At first the banks were frequently broken into steep yellow and red cliffs, indicating a proximity to the coal formation; but these gradually disappeared, and, in less than 3 miles, the narrow rocky bed was composed entirely of granite or gneiss, and the water in it was still brackish; the soil a light sandy loam. The day being warm and oppressive, with a land-wind from the N.W., and the thermometer at 104° in the coolest spot I could find, I took advantage of fresh water being found in the tributaries and swamps of this vicinity, and halted until 3 o'clock, amongst good grass in a clump of yeit trees. As we had expected, a thunderstorm began to brew in the N.W., which came on so rapidly that before we could secure ourselves in another camping place we had taken up for the night, it burst with great violence, and completely drenched us. Next day we traced this stream upwards to the total distance of 13 miles N.N.E., when, finding it took us so much to the eastward, and that the grass in its neighbourhood had considerably diminished in quantity, I left it coming from the N.E. in several branches, the valleys of which were narrow but grassy, and drained extensive elevated plains of poor and worthless character. Its mouth is near the spot where Captain Flinders records on his chart "there is a white streak in the sand-hills," and on its banks we occasionally observed some rich and very good soil. Kangaroo were abundant, and we frequently noticed traces of emu, but our only dog was so pitifully foot-sore as to be quite incapable of catching anything, nor could he be induced to keep on, even for ten minutes, the various leather boots we made for his relief. Naming this river the Gore, we quitted it about 16 miles from the coast, and crossed a western branch, as we steered westward over open scrubby downs, drained by small watercourses or lakes, containing either salt or brackish water. After a harassing march of 22 miles, we were fortunately enabled to encamp on the 12th amongst tolerable feed on the borders of a lake, perfectly fresh, and about three-fourths of a mile in diameter.

Five miles further westward over similar country brought us to the abrupt rocky banks of another river, with a samphire-bed 70

or 80 yards wide, in which were pools of salt water 20 yards by 6 or 7, but not a vestige of grass. As no inducement presented itself for following this river up to the N.N.E., I proceeded at once down to its bed to the southward, came soon to good grass where the banks opened out, and in less than 3 miles encamped in the midst of abundance of it and of drinkable water at the junction of several branches, some of which were observed to have cut their way through white, yellow, and red cliffs. While the horses took the benefit of their early halt, I minutely examined the cliffs and their vicinity, in company with Mr. Ridley; but although there was every appearance of their forming a portion of the carboniferous series, we could discover no shales nor any rocks in which could be traced a decided dip or inclination of the strata. In the evening the latitude by Menkar was found to be $33^{\circ} 44' 8''$ S.

On the 14th of December we resumed our examination down the river, eagerly examining every accessible cliff we met, but discovering no shales. Granite or gneiss, with a large portion of hornblende in it, was in contact with these cliffs, and did not raise our immediate hopes of coal; nevertheless, at $\frac{1}{4}$ a mile from the mouth of the river, a mass of dark red sandstone projected from its right bank into a deep navigable reach 70 yards across, and indicated a closer proximity to the object of our search. The water was here quite salt, and about 20 feet deep, tenanted by many fine large fish, resembling bream, upwards of a foot in length, which resisted the most tempting inducements we could hold out to them to take bait. Below this spot, the shores both of the river and of a fine large estuary which received it were low and sandy, and no more sandstone was seen to crop out upon them.

In less than a mile from the mouth of this river, our western course was arrested by the open deep reach of another, at least 250 yards across, coming from the northward, and flowing into the same estuary. Having ascertained that its mouth, which was $\frac{1}{2}$ of a mile lower down, and divided into two open channels, was not fordable, I commenced its examination upwards. The low level banks soon rose to more undulating land, of light sandy character, clothed with some good grass, extending half a mile back, and growing among myrtles, gigantic zamias, yuccas, tea-trees, Jacksonias, &c. In less than 3 miles the width of the open water had contracted to 100 yards, and a considerable peninsula, thickly covered with high grass, was projected by it to the eastward. Hereabouts several large grassy tributaries were added, and, a little higher up, a dry rocky ledge connecting the two banks obliquely, enabled us to cross to the right bank. The land on that side, however, was found to be so rocky and steep that we soon afterwards re-crossed, and finally encamped on one of

the above tributaries, at the first fresh-water hole we had found in connection with the river. Grass was here in ample sufficiency for our wants, and the river itself, which had now dwindled to a very brackish tea-tree brook, 5 yards across, wound its tortuous way through a well-grassed flat $\frac{1}{4}$ to $\frac{1}{2}$ a mile wide. Red cliffs occasionally broke out on the hill-sides thus far, and the land on either side of the river's valley had all the flat-topped appearance of the sandstone formation; but granite or gneiss was the prevailing rock on the lower levels, with occasional veins of quartz through it to the thickness of a foot. All our spare time was now directed to the horses' backs and feet, for the former required constant attention, especially to protect them from the flies, whilst many of their shoes were loose, and some cast altogether. To make good these defects in so rough a country as that we were in was most essential, but the practical knowledge of farriery amongst the whole party was only small; necessity proved, as usual, an excellent assistant in overcoming difficulties, and, without laming a single horse, Mr. Gregory soon became a practical farrier.

On essaying to follow up the river on the 15th, so many branches here fell in that it was not easy to decide on the principal one, but in such a case I deferred to the native's judgment, and kept to a valley coming from the N.N.W. At the end of a mile, a larger tributary than usual, containing considerable pools of open water, joined from the eastward, and appeared to me to be the main branch; for that which we followed to the N.N.W. soon diminished in importance, and ascended rapidly in a rough granite bed, between somewhat steep rocky banks. Although grass still covered the slopes of the narrow valley which contained the river, the latter was so much reduced in size and character that I deemed it no longer worth following, and at 10 miles from its mouth quitted it for the purpose of making a further examination of the estuary; and as that neighbourhood promised well for coal, I was desirous of ascertaining what facilities existed for its transport by water. Where I quitted this river it was coming from the N.W., and lay in irregular rocky pools, nearly salt. The stratified gneiss rock of dark glittering appearance, which here formed the basis of the country, was observed to lie in the direction of the magnetic meridian, with a decided dip to the eastward of about 15° from the vertical. Fragments of red sandstone, several inches square, lay on the surface near our rocky bridge, and contained many perfect impressions of bivalve shells. Crossing to the right bank by the rocky bridge, we came out on the estuary by some good grassy slopes near its mouth, passed close to an open salt lake which appeared to have some connection with it, across a very narrow dividing neck of land,

and then, proceeding westward, traversed open treeless plains $\frac{1}{2}$ a mile behind the shore, covered with somewhat coarse grass, and drained by a small stream-bed, now in pools and slightly brackish.

The grass improved both in quantity and quality as we proceeded, but we met with no more water, and, after sunset, were obliged to encamp without it at the foot of a rough limestone hill, where grass was good and plentiful, with a few dead sticks for our bivouac fire. On ascending our little limestone hill next morning for angles, the estuary presented a fine open sheet of water at its foot, 5 or 6 miles long and 2 wide, with a general direction of S.E. by S. to its connexion with the sea. It did not appear very deep, and several rocky shoals could be detected with a glass under its surface: but for all purposes of boat navigation it seemed sufficiently open throughout its whole extent. Next morning I completed the examination of the estuary downwards, and found limestone to be the prevailing rock, rising in steep cliffs and abrupt projections. The mouth was closed by a dry sandbar 300 yards across, and 400 yards wide to the sea, which broke heavily upon two parallel ridges of sunken rocks close in front, thus preventing any permanent channel being open except for boats, and for them only in fine weather when the water outside is smooth. From the absence of shells inside the bar, it may reasonably be inferred that the sea never breaks into the estuary at any time, but closes up again any channel which its accumulated waters may occasionally force through the bar after heavy rains. The sea-coast was sandy, fronted by covered rocks and broken by rocky projections; and from a sand hillock at the estuary's mouth I set the Rocky Islets of Captain Flinders, bearing S. 46° 30' W., distant 20 miles. Naming this inlet after my friend Capt. J. Lort Stokes, R.N., and its upper river the "Lort," I called the principal river the "Young," after the Governor of South Australia. Tracks and fires of the natives were numerous in this vicinity, but none showed themselves, nor could I spare the time necessary for finding them out.

Returning to our camp, we proceeded on the same afternoon 11 miles westward, at first over limestone country, much broken into steep ravines, and then across undulating sandy land covered by low heathy vegetation. At sunset we encamped on an upper branch of another river, which had afforded us very bad travelling for the 3 previous miles through thick matted scrub and tall rushes. Broad open reaches were observed in its lower part 4 or 5 miles from the coast, but it afforded no grass whatever, and our bivouac was amongst burnt sticks and scrub, at a brackish pool 18 yards by 10, from which we disturbed some

ducks and their young families. The latitude by Menkar was $33^{\circ} 49' 38''$ S.

Next day, December 17th, our westerly course led us 5 or 6 miles behind the sea coast, over poor country, the elevated ridges of which were chiefly granite or gneiss, with occasional red sandstone. Grass having been exceedingly scarce since leaving Stokes Inlet, we halted towards noon to give the horses the benefit of some good feed in a valley of yeit trees, through which wound the shallow bed of a stream, now in numerous fresh pools of excellent water 10 to 12 yards in diameter. Here our footsore dog contrived, with some difficulty, to kill a young kangaroo, and as we were not able to carry it, we dined, and in the afternoon again proceeded westward. Crossing over a high open ridge of sandy gravelly soil, we came at its foot to a salt watercourse, the banks of which were broken into soft red and yellow cliffs, amongst which were fragments of dark red sandstone. Nearly 2 miles beyond this commenced a broad flat of beautiful grassy land, dotted with yeit, wattles, and hakea, growing in good soil. At the end of a mile and a half we came to the watercourse which drains this plain; it was 8 yards wide, brackish, and winding to the S.W., at the S.E. foot of a steep cliffy back. Here we halted for the night, and I observed the latitude $33^{\circ} 49' 6''$ S.

From the summit of a long sandy ascent of 2 miles next morning, the rocky islets before mentioned were again seen bearing N. $161^{\circ} 45'$ E., at the distance of 7 leagues; and the "Seal Rock" of Flinders was recognized through the haze, 9 or 10 leagues distant, bearing N. $223^{\circ} 30'$ E. Some high breakers which had been seen on the 17th, about 3 miles off shore, were now again visible in a line with Seal Rock, and are thus mentioned because they are not noticed in the existing charts.

As the coast now seemed to take a decided turn to the W.S.W., and to be backed by sand-ridges and open downs of no inviting appearance, I maintained my westerly course for the purpose of striking a river which Bob said we should encounter on the E. side of East Mount Barren, and on which he reported some good grass was to be found. Soon after noon we obtained our first sight of the lofty hills of the above range, about 40 miles to the westward, but throughout the day passed over open country of very poor description and destitute of grass. No improvement taking place when the day closed in, we halted, under almost the only bushes visible, in a bleak open plain, which seemed scarcely to have a limit, and across which a strong S.E. wind did its best to extinguish the very scanty fire we found materials for making. The only cheering object in view was a watercourse 6 to 10 yards wide, in which water, as salt as brine, was winding very tortuously and slowly to the W.S.W., but its

banks and bed were composed of dark red sandstone, and the same encouraging rock had frequently been passed in the course of the day. The latitude of this inhospitable bivouac was found to be $33^{\circ} 48' 26''$ S. Half a mile westward of it, East Mount Barren bore W. $10^{\circ} 15'$ S., and a considerable hill, about 7 leagues distant, which I called Mount Desmond, W. 28° N.

Soon after noon of the 19th I gave our hungry horses the chance of picking up something amongst some low scrub in a small fresh swamp, and at the end of 14 miles made up all deficiencies by encamping them in good grass on a considerable stream, slightly brackish, and lying in pools 100 yards long by 15 or 20 yards wide.

The river here had a great and rapid fall among sheets and blocks of fine grey granite, which composed its entire bed and banks, with exception of occasional accumulations of a coarse quartzose pebbly sand, which had been carried down by freshes, and now lay in heaps 3 or 4 feet above the ordinary channel. The water in some of the holes in the rocks from 2 to 12 feet in diameter, was found to be perfectly fresh and good; whilst in others almost in contact with them it was far too brackish for use. The pools and holes were not full, and thin layers of salt, encrusted on the rocks, showed the gradual process of evaporation as the river had ceased to run. The fragments or débris on the banks (for in the actual bed of the river there were none) consisted chiefly of waterworn pieces of granite, quartz, whin, streak-stone, red sandstone, oolitic conglomerate, and a variety of fragments of a dark slaty colour, and very hard close grain. Calcareous rocks and red sandstone had repeatedly occurred during the day as we passed over a rough undulating country otherwise uninteresting.

On the 20th of December, as we advanced westward, the geological indications acquired additional interest in our eyes at every watercourse we crossed, for the intervening scrubby country showed nothing more remarkable than the occasional outcrop of red sandstone in a gravelly sandy soil. At $3\frac{1}{2}$ miles from our last camp we crossed a river, in pools 100 yards by 20, and perfectly fresh, running slowly to the S.S.W., between banks which frequently broke into red and yellow sandstone cliffs. On examining these and the interesting débris at their feet, the prospects of coal being not very remote were greater and more encouraging, for we seemed to have got much lower in the carboniferous strata than in the stream-beds to the eastward. Flaky ironstone of a hard flinty texture was found at a low level, together with pebbly concretes, and layers of waterworn pebbles were also embedded in the cliffs. Amongst the débris of stones and gravel in the river's bed were fragments of slate, flint, and

apparent chalk, the same being also embedded in the rocky banks. From this spot the sharp-peaked summit of the lofty rocky range in advance bore W. 10° S., about 14 miles distant, and towards it we shaped our course, crossing three more streams of smaller size and fresh, running to the southward in grassy valleys, the developments in which made us long to linger on spots so geologically interesting: for in some of them the slaty coal-shales appeared, and were closely traced as far as visible.

The intervening ridges were high, steep, and rocky, and well covered with thicket and scrub, which appeared also to continue on the lower grounds, as these hills broke off into a descent $\frac{1}{2}$ mile to the S.

The horses' feet now suffered so much from the extreme hardness of the rocks, which in many places required the greatest care in avoiding their sharp knife-like edges, that I did not regret when a valley, deeper and wider than the others, at length lay at our feet, and promised to afford them a respite on its well-grassed flats. Descending its steep and rugged slope, we encamped at 4 o'clock in the midst of luxuriant grass, in a valley $\frac{1}{2}$ a mile wide, through which was winding, in a very tortuous course, the river which Bob had described to us as draining the eastern side of the range. Here the scenery was altogether rich and beautiful, such as, in contrast with our former scrubs and thickets, we seemed never tired of contemplating. It was, however, limited; and the effect was chiefly produced by the abutment into the rich grassy valley of several small projections from the higher land, composed entirely of fragments of red sandstone, quartz, and thin scales of micaceous slate, of every hue and colour. These projections and their intermediate little grassy ravines were beautifully studded with wattles and small ornamental trees; and above all rose a dense mass of dark green foliage, reminding us but too forcibly of the impenetrable thickets with which we had contended in the interior.

As the morning of this day had been wet and stormy, with much thunder and lightning from the S.E., and clouds were again piling up in heavy masses, threatening a continuance of the storm, I avoided all trees and conspicuous objects in selecting our camp; and fortunate it proved that I did so, as before the sun went down a thunder-storm, which had been gathering in the N.W., burst furiously upon us from the opposite quarter, and would have swept everything before it had we not been sheltered by a little thicket of saplings. This continued and even increased; and until early morning we seemed to be the sport of one continued dark thunderstorm, passing from S.E. to N.W., and *vice versa*. The lightning gleamed and darted about us most vividly; and the sharp cracks of thunder seemed to be in our very presence, and to explode close by us. The rain did not fail to play its part either;

and by the time all was over our ammunition (in waterproof canisters) was the only article left dry, for our frail calico tents might as well have been struck at the outset.

At daylight nature smiled out upon us as if nothing had happened; and we proceeded on the labours of the day as soon as we could dry some clothes, and had looked about for the damage done by the elements; but excepting the leaping and brawling of the water-channels around, and the occasional grumbling of the distant thunder, no vestige appeared of the recent storm.

On examining the river 100 yards to the westward, it was found to be in deep open pools of considerable size, formed entirely out of a light-coloured greenish rock, laminated and stratified. Its lay was E. 30° N., and W. 30° S., with occasional deviations, amounting to 10° or 15°; and the dip was estimated at about 60° to S. 30° E. Thin veins of metamorphic ironstone traversed the strata, without any regard to order or arrangement; and to all appearance the whole of the adjacent range was of the same formation, its naked rocks being plainly visible to the eye.

Mr. Gregory, in following up the river's bed a few hundred yards, having found some loose pieces of micaceous slaty rock, apparently coloured black by a bituminous substance, and resembling a slaty coal, we proceeded on our examination of the river upwards with renewed hopes, and at a part of it $\frac{1}{4}$ m. W. from the last bivouac, came upon shales of a promising character in the bed, of a deep slate colour, approaching to black, and apparently bituminous, with thin veins of still darker substance like coal between the layers. The direction and dip of the strata were as before stated; and the sides of the steep hills which rose from the river's bed were strewn with fragments of the same slaty appearance, but more hardened by exposure to the atmosphere.

The rains of the previous night had unfortunately filled all the lowest levels in the river's bed, and had also set it running, as well as every adjoining tributary. The bed was likewise so encumbered here with rocky fragments among the deep pools as to render our search difficult, tedious, and incomplete; for at the time it was in progress the horses were struggling and floundering across the rich grassy peninsula formed here by the right bank, where the land lay very low, and had been rendered soft and boggy by the rains; I therefore felt desirous of securing for them a firmer footing on the higher ground, and for this purpose cut off angles of the river which would otherwise have been more fully examined.

As we proceeded upwards, the obstacles and impediments near the river increased, and I found it necessary to withdraw the horses altogether from its vicinity, while in a condition to do so. While therefore Messrs. Gregory and Ridley traced its bed I conducted the party through the dense masses of thicket we had seen

from our camp, as the only means of getting above some steep rocky cliffs which occurred on the western side of them. By the time these were cleared, at the expense of much scratching and tearing, the party from the river's bed rejoined us, and reported that they had fallen in with coal shales, if not the actual coal itself, of far superior quality to that already noticed, and that it lay in large blocks in the river's bed. Not being aware of this till we had long passed the spot, I did not see it, but continued my search for some grass and a proper camping place, the horses being greatly fatigued with their harassing hill-work, and some of them very foot-sore.

Ascending a peaked rocky hill, 2 miles N. from the range, the river was observed to occupy a very steep rugged valley in the intermediate space, and to be in large pools. Above this it was observed to wind through extensive grassy slopes from the N.N.W. and N., its numerous tributaries being also well grassed, and the principal valley 15 or 18 miles off in the direction of N. by W. One of these tributaries, not so grassy as the others, seemed to cut its way almost wholly through a red sandstone country, and could be traced by its cliffs many miles to the W. and N.W. from its mouth, a little above the hill we were upon. Several lofty and abrupt hills of varied and peaked outline were observed between East and Middle Mounts Barren; and the latter itself appeared at the distance of 30 miles on the bearing S. 50° W. All these hills seemed to be composed of the same light-coloured micaceous slaty rock as that which formed the range near us.

Having given to the latter the name of Mr. Eyre, the indefatigable explorer who was the first to report its existence, we descended from our rugged elevation, and encamped 2 miles further to the westward, a little above the mouth of the tributary already noticed with the red cliffs. Here grass and water were abundant, and the rock chiefly red sandstone conglomerates, mixed with slate, and a variety of others in loose and promiscuous heaps.

At this camp we seemed to have got quite above or to the N.W. of the main coal seam of this river, which will in all probability be found to crop out in its bed between $\frac{1}{2}$ mile and $1\frac{1}{2}$ mile in a direct line above our bivouac of 20th December, from which East Mount Barren bore S. $28^{\circ} 45'$ W. and the N. end of Eyre Range W. $\frac{1}{4}$ S. I should even now have proceeded on foot for its further examination, but Bob assured me it was not the spot in which his friends had told him coal was to be found, and to which he was very desirous we should proceed without delay.

I have been thus particular in describing my passage across this coal-field, in order that others who may hereafter follow up the

discovery may be fully aware of what has been left incomplete. That coal exists in the locality pointed out there cannot remain the slightest doubt; for although the later specimens were so unfortunately lost, sufficient were seen and brought away from the neighbourhood to settle all doubts; and I have little fear but this valuable mineral will be found in considerable quantity where I have stated. Its locality is favourable, at 8 or 9 miles from the sea-coast, and probably 5 or 6 only from the head of an estuary which was seen at a distance to receive the river on the eastern side of East Mount Barren. This estuary (which was named Culham Inlet, and its river the Phillips) is probably navigable for boats for a few miles, but, like all the inlets on the coast, is doubtless shut up by a dry sand bar at its mouth, except during a small portion of the rainy season. This bar, and the anchorage off it, would be only 50 miles from the southern part of Doubtful Island Bay, where steamers might coal in security from a depôt.

Being desirous of searching as soon as possible for the coal which our native had heard existed farther to the westward, and in a position so favourable as to admit of its being readily embarked in a boat, I proceeded previously to ascend the Phillips, and to examine the good country we had seen in its several valleys on the 21st. Here we found much good grassy land in the vicinity of the river, and of its numerous branches and tributaries, the greater number of which came from Mount Short and the Ravensthorpe Hills, and were mostly fresh, though sometimes brackish. Following that branch which led us most to the westward, at the end of 28 miles it had ceased to be worth following, and we proceeded S.W. over generally a poor country, but intersected by many small hollows and water-courses, containing good grass, and more or less water, mostly too brackish for use. The trap formation, through which the upper branches of the Phillips had been observed to flow, was now changed to granite, which showed itself extensively in the highest and lowest levels of an open country, without timber, and covered with low heathy vegetation, amongst which was much good feed for cattle.

On the eve of Christmas day I was enabled to give the party a long-promised rest, by reaching a well-grassed little tributary to a stream-bed in brackish pools, which was winding its way south-eastward towards the coast, in a bed of granite and trap. Here we brought forward our best for the enjoyment of Christmas in the bush, and dined off an unexceptionable roast saddle of kangaroo, followed up by a pudding, which Buck had manufactured out of soaked biscuit and sugar, and an allowance of brandy from the small stock we had carried as medicine. There was reason to believe that our repast was overlooked by a party of natives from the rising ground above, whose suppressed voices reached the acute

and practised ears of Bob, but whose presence could be nowhere discovered on our searching and calling out.

Numerous traces of emu and kangaroo were about our camp, as well as of horned cattle, but the latter were not recent. Of emus we saw but few as we passed through the country, but kangaroos were very numerous. The lat. of our camp was found to be $33^{\circ} 45' 41''$ S.; but the cloudy, showery weather greatly interfered with observations of this kind, although otherwise welcome, as affording us a good supply of water among the rocks.

On the 26th, our journey S.W. was resumed with renewed spirits and energy; and at noon we felt that another important stage in it was performed by our gaining a misty, indistinct view of the Stirling range, about 80 miles to the W.S.W. We had then reached the system of waters belonging to the river on whose estuary our native supposed we should find surface coal, and observed increasing indications of its vicinity in red and yellow cliffs, and in the sandstones being in connexion with granite, a water-course in a deep valley alone separating them. Here we also saw West Mount Barren about 30 miles distant, bearing S. $6^{\circ} 10'$ W., and a remarkable double-topped peaked hill to the eastward of it, which I called Mount Bland, bearing S. 5 E. Crossing the water-course last mentioned, in its rapid descent to S.W. by S. we found travelling difficult and rugged among numerous small rocky ravines, and finally steered to the southward to avoid them, and get upon more level land. At the end of 5 miles of level sandy country we came upon another branch of the river, winding to the southward in a very tortuous course, at the bottom of a rocky steep valley $\frac{1}{2}$ of a mile wide. Here occurred the white, streaked, and coloured sandstones we had previously noticed on the Phillips, in close connexion with the coal, accompanied by the same ironstone veins, deep red sandstone, water-worn quartz pebbles, and rough coarse conglomerates, which had been observed to accompany them. Climbing over the edge of a perpendicular cliff, 150 feet high, overlooking the river in the bottom, caverns 8 feet deep were found to have been excavated by the atmosphere in the softer white sandstones, and the entire geological formation lay most beautifully before us.

The surface in this dangerous vicinity for our horses being extremely rugged and thick, I felt glad to remove them away southward as soon as possible, where the land seemed to descend, and to become more open as the distance from the river increased. At the end of $2\frac{1}{2}$ miles we were again upon the verge of a similar sharp bend of the river, winding through a valley $\frac{1}{2}$ to $\frac{3}{4}$ of a mile wide, and bordered by broken red and white cliffs, 50 to 80 feet high, and in many places perpendicular. The whole country hereabouts was extremely rough, and thickly covered with scrub,

rendering the greatest caution necessary in threading our way slowly amongst the concealed rocks and holes. Descending to the river's bed by a low hill of granite protruding amongst the sandstones, we came there upon large pools of brackish water, and observed many indications of their being sometimes as high as 25 feet above their then level. Half a mile below this we encamped amongst good grass, in a rich flat, formed by the windings of the river, which then seemed to pass amongst numerous flat-topped ridges with narrow summits, sometimes bearing the appearance of perfectly level tables, and in other views assuming the form of sharp red peaks. Our native recognised this river as identical with that on which we were detained on the 25th of October by rainy weather and soft ground, about 15 miles to the N.W.

To abandon our search for coal at this most interesting period was not for a moment to be thought of, and we determined at all hazards to persevere in researches which now appeared so likely to be crowned with success. Choosing the smoothest way that could be found among the sharp rocks, we resumed our descent of the river on the 27th, watered the horses at a pool not quite so salt as those higher up, and in 2 miles from our camp passed the mouth of the main branch, coming from W. by N., in a valley $\frac{1}{2}$ a mile wide, with steep cliffy banks. The river itself wound through an intermediate flat of grass and rushes, and was at this time running slowly between large pools; but the presence of samphire seemed to indicate that the water is not at all times fit for use. On the authority of our native, this main branch comes from Jeër-a-mung-up, where we had seen so much good country on the 22nd of October last, 30 miles to the W. by N., the whole of which space he also said was well grassed, and fit for good stock runs. Up to this time we had been in the geological formation, previously noticed, of granite on one side of the valley, and perpendicular sandstone cliffs from 50 to 100 feet high on the other. Half a mile lower down we passed the mouth of a steep cliffy valley, with a water-course in it coming from the N.; and being then on the high ground, observed the tracks of three horses and a pony, supposed to have belonged to our indefatigable botanist, Mr. James Drummond, who was known to have been recently in this part of the country prosecuting his favourite pursuit. Avoiding the cliffy bed of the river in this part for $2\frac{1}{2}$ miles our travelling was improved, and we were then abreast of another steep valley from the N., $\frac{1}{2}$ a mile wide, and of the same sandstone formation as the others.

Taking again to the river's bed at this part, we were at length cheered by the sight of shales cropping out on its left bank, and in the bed found a small piece of undoubted coal. Halting the

party, further search was immediately made upwards, and all former toils and sufferings were amply rewarded *by the discovery of extensive beds of coal*, occupying the lowest levels in the channel of the river. The part exposed fully to view was 12 to 15 yards wide and 61 in length, N.N.E. and S.S.W., any further development being concealed by loose drift sand, covered with thick scrub, which occupied the whole valley except the immediate channel in use. Mr. Ridley afterwards found amongst this scrub another flat bed of even better-looking coal, 80 yards long and 6 wide, in contact with the lower end of the above;—and there is every reason to conclude that, on clearing away the drift sand and examining the beds of the deep pools hereabouts, the breadth of coal will be found much more extensive. It seemed to lie horizontally, without perceptible dip or inclination, but the adjoining shales which cropped out on the river's left bank showed a dip of 45 degrees to the S.E., and precisely resembled those which had previously been seen on the Phillips.

Diverting the small run of brackish water to a side channel, a pit was dug 5 feet long and 3 feet deep through the mass of coal, without observing any change whatever in its appearance, which was that of carbonized wood, resembling pine. The grain could be readily traced, and some of the pieces appeared even not to have been completely converted. Having been so long saturated with water it was exceedingly tough and compact, and until dried did not break with a brittle fracture. Elongated globules of bitumen, from the size of a pea to that of a goose egg, were found in it, as if endeavouring to force their way to the surface. As our mining tools consisted only of a spade and a tomahawk, and I was desirous of moving on while daylight favoured us, we did not penetrate more than 3 feet, but dried some of the upper and lower pieces, and put them through the test of burning. This proved most satisfactory,—they burnt with a good flame, and without the slightest crackling or flying,—emitted a regular coal smoke and strong odour, and left no residue but a soft white ash. The result was equally satisfactory when we submitted some of it to the process for gas, by means of a tobacco-pipe and some clay.

The river's bed was here 200 or 300 yards wide, between very steep banks, and was filled either with rank grass or dense thick scrub. Many marks of floods were visible to the height of at least 20 feet, which will render care necessary in selecting proper sites for shafts to work the coal. On the left bank, and in its small deep ravines, cropped out the shales in all that interesting variety we had observed on the Phillips, and their corresponding appearance tended more than ever to confirm the opinion we had formed, that we had been upon a bed of coal in the latter locality, and

that it would have appeared in view had not the river been set running by the rains of the previous night.

Having fully satisfied ourselves and feasted our eyes on the broad sheet before us, which was calculated to prove of such important benefit to the colony, we took away as much of the coal as could be conveniently carried on our jaded horses, and moved away to where Bob remembered to have drunk fresh water from a well amongst good feed for the horses. In 1 mile E. by N. we reached it, and were afforded another proof of the unerring memory and instinctive sagacity of the aboriginal native, in thus being able in so intricate a part of the country, almost totally unknown to him, to walk direct to a small water-hole, entirely concealed from view amongst tufts of grass. Plunging into the midst of these, our sable friend remained at least two minutes under ground, and then re-appeared with a distended stomach, and the welcome intelligence that plenty of good water existed 6 feet below the surface. Encamping immediately, under shelter of some neighbouring bushes, the spade was tried, and soon produced fresh water 2 feet below the surface, and therefore accessible to the horses, to whom and to all of us a little fresh water was quite a treat. These wells were in a grassy tributary to the coal river, the steep white banks of which were visible $\frac{1}{4}$ of a mile below our camp. In the mean time Messrs. Ridley and Gregory had followed that river downwards a short distance, and reported that 1 mile below the coal the shales were still abundant, but apparently in some disorder, the dip being changed from S.E. to S.W., and occasionally to the S. They saw no more coal, and found that a very white appearance, which covered the entire right bank of the river below the coal-bed, was caused by numerous fragments of white quartz, which had apparently fallen from the surface of the land above, and had become partly embedded in the soft slaty and clayey shales. Menkar on the meridian gave the latitude of this camp $34^{\circ} 1' 28''$ S., and abrupt red sandstone hills, flat-topped and peaked, rose up around it in every direction.

The inlet which receives this river being that on which our native had been informed a French whale-ship had procured coal for use, I determined on giving it a close inspection, and, with that view, recommenced our descent of the river on the morning of the 28th of December, keeping as near as possible to it in order to watch the indications. The river was here in pools, in an open valley $\frac{1}{2}$ a mile wide, well supplied with spear, kangaroo, and other good grasses, growing among yelt trees and the maling-wattle, both of which indicate a superior soil. At less than a mile from our camp a tributary joined from the right, opposite to an elevated quartz slope, almost a cliff, on the left

bank. The valley soon afterwards contracted to a width of 200 yards, and became clifty and steep; shales again appeared in abundance on the left bank, crowned by a superincumbent mass of ironstone, but the intervening bed of the river would not afford a practicable passage by which we could get at them. They appeared, however, to dip as formerly, 45° to the S.E. The general direction of the river was here to S. by E. $\frac{1}{2}$ E. for nearly 3 miles; its valley was narrow, and filled with slaty shales blending with quartz; all the water in its long pools was bad, and the banks were so contracted, precipitous, and rugged that it was frequently necessary to reconnoitre far ahead before we could venture to advance with our weary horses.

Two tributaries now fell in from the right within a short distance from each other, having a projecting grassy hill between them, and down a long reach of the river itself West Mount Barren appeared in sight, bearing S. $13^{\circ} 30'$ W., at the distance of 16 miles; 2 miles below this the river cuts its way through a bed of shales, leaving them in perpendicular walls on each side 100 feet apart, and little less in height, with red sandstone above the shales and scrubby vegetation on the top of all. From the strong and decided echo among these singular cliffs, I called the place Glen Echo, and immediately below it had the satisfaction to observe the valley of the river open out and again become grassy. From N.E. at the Glen its direction changed to S.E.: well-grassed flats, 200 yards in width, occasionally occurred, and in a steep cliff of considerable elevation on the left bank, we thought the dip of the shales had increased from 45° to 60° , but could not afford to cross over for a more minute examination. Half a mile below this no shales appeared at the surface, but red sandstone took their place for 300 or 400 yards, and the white and yellow cliffs re-appeared with a dip not exceeding 2° to the S.E., and the river at their base. Here the country became much more open, good grass appeared along the valley of the river to the S.E. and E., and we appeared to be rapidly receding from all indications of the coal formation.

We here again fell in with some horse-tracks of Mr. Drummond, together with the remains of one of his encampments, but, from their appearance, we had little hope of falling in with that enterprising botanist himself except by accident. From the dip and open character of the country to the S.E. it was evident the estuary was not far off, and I therefore took up the best situation we could find, with good water and grass, where our exhausted cattle could recover a little while we effected its examination. This camp was on a chain of low swamps, filled with samphire and green rushes, in a broad flat valley which drained into the river about a mile lower down, and Middle Mount Barren bore from it

N. $87^{\circ} \frac{1}{2}$ E., distant 7 or 8 miles. Traces of kangaroo were everywhere abundant, together with some of emu, and the bones of both were plentifully scattered around two large and very recent huts of natives near our camp, which seemed to have been occupied by them within the last two days, for the branches which had been used in their construction were still green and fresh. Like most of the huts or shelters we had seen scattered over several hundred miles of country, these were of very rude and primitive construction, having been formed by merely placing broken-off branches in a semicircle, and resting their broken ends in a strong forked support sloping towards them in front. The fire, which always forms part of a native's encampment, is invariably small and without flame, and is made within or without the support in front, according to the size of the hut, or to the number of persons it is intended to shelter. Near rivers or swamps which produce the tea-tree (*melaleuca*), its paper-like bark is used to cover in the huts, and is very loosely and carelessly thrown across straight sticks, stripped of their leaves, stuck in the ground, and arched over to a general interlocking at the top.

Having seen the camp established, and our horses feeding on the choicest spots of soft green grass which had been selected for them, I started with Messrs. Gregory and Ridley and the native, at four o'clock, mounted on the best of our stud, to reconnoitre the country in advance, and prepare for a more full examination of the estuary on the morrow. In less than 2 miles it came in view, about a mile to the E.S.E., presenting a fine sheet of open water, into which projected several prominent headlands promising well for deep navigation, but no opening could yet be seen to the sea. In the upper part it received some open reaches of our river, near which were also some open lakes, and farther eastward two of a sandy salt character, seemingly at this time quite dry. Beyond these we came out, at the end of a mile, upon the low swampy N.W. shore of the estuary abreast of the river's mouth, and worked our way S.E. to examine a lofty bold projection of yellow and reddish cliffs, which formed a prominent and not unpleasing object on the estuary's northern shore, 3 or 4 miles further on. As we got into its neighbourhood the land became exceedingly rocky, broken, and rough; deep precipitous ravines, which would have required a long time to examine, were found deeply to indent the shore, and the projecting abutments between them were overhanging sandstone cliffs, washed by the waters of the estuary. Leaving Bob in charge of our horses, we scrambled and climbed about, examining all we could find accessible; but when the sun disappeared behind the opposite hills, the main headland was still $\frac{3}{4}$ of a mile distant to the southward, and it would have been quite dark before we could reach it

across the thick scrub which crowned its summit. The mouth of the estuary being also observed to be about two miles distant in the S.E., and the flat summit of Middle Mount Barren bearing N. 67° E., at the distance of 3 miles, we remounted, and reached our camp soon after 8 o'clock.

Next morning (December 29th), with the same party, the examination of the estuary was resumed by passing round its opposite shore. Crossing the river $\frac{1}{4}$ a mile S. by W. from our camp, it there occupied a straggling samphire-bed, nearly dry, and took a wide sweep round the margin of a rich flat with good kangaroo, spear, and other grasses. At the far side of this flat a tributary joined from the W. out of a steep cliffy valley, and the river itself became full between its banks, winding with rather a tortuous course to the S.E. Sandstone cliffs, 60 or 70 feet high, rose from its southern shore; in some places these cliffs and the mass of rubbish at their base approached so near the deep open river that we had scarcely room to pass, and could not avail ourselves of any occasional shallows in the river's bed on account of the softness of the light-blue clay which composed it. Hereabouts the dark red sandstone again made its appearance beneath those of lighter colour, but none of them had as yet any decided dip.

As we descended the river increased its open width to 100 yards, opposite to the mouth of a lake in connexion with its left bank, the whole of which shore is for several miles very low, sedgy, and at times under water. The depth is here, however, much diminished; both banks and bed are of clay and ironstone, with many sharp masses of the latter showing themselves above water where the broad wide mouth of the river joins the estuary. Remarking a low island which divides that mouth into two channels, we passed out on to the shore of the estuary, and found both the latter and the steep banks which rise up from it extremely rugged and thick. Low cliffs of red and white sandstone abutted on the shore, and the intervening spaces were covered thickly with a lining of stunted tea-trees and salt-water bushes, obliging us to wade into the treacherous estuary in order to pass them. Round the S. side of one very prominent projection, only $\frac{1}{3}$ of a mile W. 15° N. from our steep headland of the preceding day, a cove, $\frac{1}{4}$ a mile wide and deep, extended to the westward, and received at its head a small streambed, at this time dry, winding through a steep cliffy valley, grassy at its mouth. Red sandstone and a slaty shaly rock were here prevalent, together with an outcropping of laminated quartz.

The eastern side of the cove above-mentioned was formed of another steep red and yellow cliff, similar to that on the opposite shore. Its ridge was extremely rugged, steep, and thickly

scrubbed, and not finally surmounted without much scrambling and tearing; but all bruises and broken shins were soon forgotten when, at the seaward side of the cliff, *the same kind of shales lined the shore as those we had seen in the vicinity of the coal.* With raised hopes we proceeded, and contended against every obstacle, but, as usual in these close proximities to coal, the country was so rough and intricate that, notwithstanding our great eagerness to move on, the whole party were frequently hemmed up into the smallest possible space, without power to stir another foot until a new opening could be cleared. In our desire to avoid these formidable obstacles to our progress, and save time and distance as much as possible, we took advantage of every opportunity to wade in the estuary whenever circumstances permitted; but as the water was thick, and its depth not always apparent, our horses' legs were sometimes endangered by their plunging suddenly into deep holes amongst the sunken rocks. Such an accident threw one of them on his side, and caused some apprehension for his limbs, and even for his life, before he could be unloaded and got out again. The shales we here saw on an E.S.E. course of about a mile, were crossed by us obliquely as they rose out of the estuary, and lay in the general direction of between W. 20° S. and W. 27° S., with an uncertain amount of dip to the S.E. and S.E. by S. of about 45°. They then disappeared under the steep white sand-dunes of the sea-coast, which were covered thickly with flags and scrub. Below the shales the estuary contracted rapidly from 14 miles to a width of 300 yards, and in some places even to 150 yards, and the depth of water in this narrow pass soon diminished to 3 or 4 feet, on a soft muddy bottom. A mile and a half from the shales, through much thick tangle, took us to the mouth of the estuary, which we found about $\frac{1}{4}$ of a mile wide, and choked up by a dry bar of fine white sand at least 300 yards across to the sea-rollers. From appearances within this bar, and from the general absence of marine shells on the shores of the estuary, it seemed likely that the sea seldom, if ever, broke into it, but rapidly closed up again any opening which occasionally might be made across the bar by the accumulation of water within after heavy rains. The small bay outside was sandy and apparently clear of rocks, but was somewhat shoal near the beach, and could afford no shelter to shipping from the strong S.E. winds of summer. From all northerly and S.W. winds it seemed perfectly secure, and boats would find the best landing at nearly all times where the high rocky shore commences at the S. end of the bay. The water is there smoother than in other parts of the bay more exposed to the S.E., and good landing might be secured by means of a very short jetty. From the bar Middle Mount Barren bore N. 474° E., 3 miles distant.

Feeling disappointed that the surface coal (if any exists on this shore) should hitherto have eluded our observations, after the plain indications we had witnessed, I proceeded N.E. to search for any probable outcrop along the beach, and observed the sand dunes of the coast to be supported and partly formed by calcareous sandstone in horizontal layers or low cliffs, among which were many fragments of slaty shaly rocks. To seaward of these, appearances were in favour of fresh water being procurable in many places among the sand-hills at a very short distance below the surface, and at the end of a mile and a half a remarkable spring of excellent water was found trickling from the bare dunes at a considerable elevation above the beach. We found most tempting little pools of fresh-water in the pure sand amongst the limestone rocks and our native said that good water was always procurable here by scratching a small hole in the sand.

The surface now became strewed with many fragments of thin slaty rock, and at the end of a quarter of a mile I stood upon the summit of what had appeared from a distance to be a large bare sand-hill, but which in reality proved to be a mass of coal-shale, blended with a whitish schistose rock disposed in thin parallel plates. The whole was highly glazed over, by the influence probably of the sea air, and bristled up so sharply at an angle of 5 or 10 degrees from the vertical, that the hill was perfectly impassable for horses. The dip of the shales was here found to be curiously enough S.W. by S., which, combined with the great alteration also observed in the angle of its dip, proved that a very great geological change had taken place in the features of the country within the space of 2 short miles. I had visited the hill because it lay in the direction towards which the shales were tending from the southern shore of the estuary just left. A continuation of those shales I certainly met with, as expected, but showing so different an arrangement as to direction and dip, that I could only account on the spot for the sudden change by supposing that the Middle Mount Barren ranges had been thrust up from below at a period subsequent to that which formed the country around them. The flat-topped summit of the mount was distant only 1 mile to the N.E. & E., but in the bottom of that short space lay another inlet from the sea, with a dry sand-bar at its mouth, and two streams flowing into the head of it, which was less than 2 miles distant to the W.N.W.

As the sun was near the horizon by the time I had completed a round of angles from this bare hill, and we had yet much to do before reaching our camp, I moved on westward, and in 2½ miles came to a part of the larger inlet just below its very projecting cliffy headland.

Having from the opposite shore considered this spot worthy of

inspection, the horses were left in charge of Bob while we scrambled down the steep rocky bank to some low cliffs, and fully examined them and the adjoining shore up and down. The cliffs were of light-coloured hard sandstone and conglomerates, in massy horizontal layers, and the land in front was low, very swampy, and thickly covered with tea-trees. Although this spot was in the line the shales were taking from the opposite shore of the estuary, not the least appearance of any was here visible, nor anything further to indicate the near proximity to coal. As the day had now closed in we recovered our horses, and soon after dark reached the camp, though scarcely satisfied with the unproductive result of our harassing day's work.

That coal exists in the vicinity of the lower part of this estuary, although probably not at the surface, there seemed no reason to doubt, all its attendant clays, shales, and sandstones, ironstone veins, conglomerates, &c., having been there seen in abundance; but the great derangement which is observable in all the geological strata near the sea about Middle Mount Barren is calculated to throw out any but a practised geologist, and to lead to a belief that, if coal is discovered there at all by any other person, it will be by mere accident. It was gratifying to find that the estuary itself and the lower reaches of the river afforded good and open navigation for boats in a space of 5 or 6 miles to the bar, which was distant only 24 miles from sheltered anchorage in the southern part of Doubtful Island Bay, where, on the formation of a dépôt, steamers might lie convenient to the shore, and coal in security. Notwithstanding also the roughness of the 7 or 8 miles which intervened between the coal actually discovered and the head of navigation on its river, there is reason to believe a very good and tolerably level road may, without much difficulty, be carried between them, and probably between the coal-bed and the nearest bay of the sea coast to the S.E., distant about the same number of miles; but of the latter I have no means of speaking with any degree of certainty. With these facilities, aided by the projection of a strong pile jetty into the bay at the estuary's mouth, the inexhaustible bed of coal we discovered on the 27th of December may, at this particular juncture, be considered a most valuable acquisition to the colonial resources, and if worked and rendered available for the use of steamers, will have presented itself very opportunely on one of the intended lines of steam route.

These important considerations connected with the river on which we were encamped, joined with the large quantity of good country we had seen on its upper branches, induced me to name both the river and the inlet after Governor Fitzgerald; the small river on which we halted on the 26th, and which forms a pretty little tributary to the Fitzgerald, being called the Elwee.

Aldebaran on the meridian gave the latitude of our camp $34^{\circ} 3' 26''$ S.

Being now in possession of the material facts that a broad seam of coal, if not several parallel seams, traversed this part of the country in an E.N.E. and W.S.W. direction, and that we had been very near to, if not actually upon, one of them, amongst the red sandstone lakes, noticed on the 12th of November, 160 miles to the E.N.E., I became very desirous of tracing these seams further in the opposite direction, where they might possibly be detected cropping out on some of the various stream-beds and inlets which fall into the south coast. I accordingly broke up the camp on the evening of the 30th, and proceeded from this interesting locality towards West Mount Barren, regretting that time did not admit of my making some further examination of Fitzgerald Inlet, amongst the precipitous rocky glens of which it seemed very probable that coal might even yet be found, near the surface, on further examination, with the assistance of a boat.

Proceeding S. from our camp of the 28th and 29th of December the Fitzgerald was crossed at our former ford at the end of three-fourths of a mile, and we then entered on an extensive level flat of excellent kangaroo grass, which had afforded our horses rich and abundant food. Beyond this we emerged from the valley of the river by ascending one of its tributaries coming from the westward, where the country was exceedingly rough, steep, and rocky, covered with coarse stunted scrub, and difficult of access. Further to the south it appeared even worse.

At the end of 5 miles we crossed over a poor sandy ridge at the source of this branch, and then crossed two others belonging to a different stream, which seemed to have its exit to the sea by a break in the coast hills 3 or 4 miles to the southward. The country around was extremely rocky, rugged, and scrubby. In the westernmost of these branches we crossed a briny salt stream, in pools, at foot of some well-defined yellow and brown sandstone cliffs, commencing 80 or 90 feet below the general surface of the country above. Salt was encrusted upon them, and had oozed out between the layers.

In 3 miles more over open gravelly sand plains covered with low heathy vegetation, we were passing 1 mile to the N.W. of the remarkable double-topped summit of Mount Bland, and both here and at the adjoining hill, West Mount Barren, observed a singular change in the character of the vegetation. Many plants and shrubs, long lost sight of, here reappeared under the protection of the hills. Mr. Drummond's new *Hakea Victoria* especially seemed to be perfectly at home in all its splendid magnificence; and we felt another stage had been accomplished in our journey by the reappearance of the "Mingart," or honey-bearing *Banksia*, so prized, by the natives during its flowering season.

West Mount Barren being passed on its north side, we were descending from a shoulder about half a mile westward of its western base, when shales were again met with, lying as before W. 25° S., and *vice versa*, and dipping S.E. at an angle of 5° or 10° from the vertical. They were extensive, and seemed to traverse the mount also through its whole extent, the neighbourhood being likewise strewed with quartz, ironstone, and all the conglomerates and rubbish heretofore observed to be associated with the shales.

The land continuing to dip as we proceeded S.W. along a small watercourse, with the shales occasionally visible at the surface, we came, at the end of 3 miles, to a very abrupt descent, almost amounting to a cliff, of red sandstone, overlooking a river at its base, winding to the S.E. Much good grass was in and about its bed, the main branch of which seemed to come from the S.W. and W., and to be joined immediately beneath us by a grassy tributary from the N.W. Descending carefully and without accident, I encamped amongst yeit and mānūng wattle, at the fork formed by the tributary, and found the water in one of the large deep pools fit for use. Grass was in the greatest abundance and of the best description, fit at this time for making many tons of excellent hay; the kangaroo grass in particular being in its prime, with heavy seed-tops and young green shoots below.

This day's rough travelling again forced upon me the necessity for sparing the horses as much as possible in such a country, and indeed ourselves also; for not only were the shoes of the former lamentably on the decline, and their feet very sore, but some of the hipeds of our party were likewise nearly unshod, and neither nails, leather, nor tacks remained to effect any more repairs. It was therefore with some concern I learnt from our native that this river came through a very rough and rugged country; though the disagreeable information was somewhat qualified by the assurance that the good grassy land upon it extended only a short distance further upwards, and was then replaced by thick scrub. This changed my first intention of tracing it up, and induced me to proceed next day in the opposite direction, for the purpose chiefly of examining the river's estuary, the mouth of which I remembered to have passed some years ago on the western shore of Doubtful Island Bay.

Observing the latitude of our camp to be $34^{\circ} 14' 5''$ S., and West Mount Barren to bear N. 21° E., 3 miles distant, we proceeded E.S.E. down the river in the morning; Messrs. Gregory and Ridley tracing the bed as far as the termination of the cliffs, $\frac{1}{2}$ a mile lower down, with the chances of falling in with an outcrop of coal. None, however, appeared; and 1 mile further the estuary was seen, its mouth being about 4 miles distant to the E.

The natives call the country around this sheet of water Yār-de-lup, and the land about the Fitz-Gerald Inlet, Gōāng-meip. Our river now assumed a more bold and decided character, sweeping in fine open reaches 40 to 60 yards wide in the space of a mile, when it joined the estuary near a red cliff of considerable elevation on the left bank. The country around had nothing to recommend it; but the estuary appeared, through the trees which lined its southern shore, to be open, and navigable for boats. Several long points projected into it along its entire length of 3 miles, forming on either side deep bays or coves, in which were observed many ducks, teal, and black swans. From a dry sand-bar at the mouth of this estuary, Point Hood, which forms Doubtful Island Bay, bore S.E. by S., 4 or 5 leagues distant; and the sea-shore abreast was observed to be free of rocks, but without any headland or bay to afford shelter for boats or small craft. The anchorage in the southern part of Doubtful Island Bay being, however, only 9 or 10 miles distant, would always afford a ready and valuable resort for vessels, should this estuary ever be brought into requisition for the transport of coal by water.

Outside the bar the beach is very broad and level, and good fresh-water is procurable by scratching to the depth of a few inches in the little sandy hollows behind high-water margin.

Naming this inlet the Gordon, and its river the Gairdner, we quitted both and proceeded five miles along the beach to the S., where the travelling was good, and enabled us to avoid much rocky and rugged country. After crossing the dry sandy mouths of several small water-courses in pools, some fresh and others salt, which discharge themselves upon the western side of this bay, we quitted its sandy shore at the commencement of the granite formation, and proceeded 6 miles S.W., over very uneven grassy land, bare of timber, except clumps of tea-trees and peppermint in numerous small hollows, and abounding in kangaroos. This space would afford cattle or horses a good run, but is in some parts too much covered with low scrub to answer for sheep.

Coming out then on the shore of Bremer Bay, we made use of its soft sandy beach for 3 miles more, a heavy sea rolling in, with a strong southerly wind, and breaking high at the distance of 150 yards from the steep sandy beach. At 50 to 100 yards behind the shore, high sand dunes, scantily clothed with bushes, were partially supported by a long line of white cliffs of calcareous sandstone, which also abutted on the granite formed land at the northern end of the bay, but had there changed in colour to red and yellow. At the more sheltered southern corner of this long beach is the sandy barred mouth of another inlet from the sea, which I had on a former occasion ascended in a whale-boat to the distance of 10 or 12 miles, and was now desirous of further

examining by land. Crossing its dry bar, therefore, and considering in passing that the waters of the estuary were at least 5 feet above the level of the sea outside, we encamped after dark at a good spring-well of excellent water, a mile further up, in the midst of a small patch of rich luxuriant feed for our tired horses. The soil is good, and much mixed with marine shells. Red cliffs were visible on the northern shore, between 1 and 2 miles higher up; but the indications for coal since leaving the previous camp had been but few and remote, granite appearing to form the basis of the country along this portion of the coast, and the red sandstones to retire further inland.

Here we exchanged our limited congratulations on the succession of a new year. The 31st had been very cloudy and threatening, with light showers from the S.W. These increased after we encamped, and the old year 1848 went out with us exceedingly wet and boisterous.

Jan. 1st, 1849.—Proceeding, after breakfast, to the examination of this inlet upwards, in a westerly direction, we soon found the face of the country so rugged, and broken into precipitous rocky gullies and ravines, that to make any progress near its shore was a task of no easy accomplishment. Matters grew even worse as we proceeded, and at length finding that only detriment and loss of time ensued, and that our weary horses (who had lost 25 shoes amongst them) could scarcely be got along at all over the stony surface, I encamped about 5 miles from the mouth of the inlet, and next day proceeded S.W., towards more accessible country behind Cape Knob. In that neighbourhood, Bob (who might now be considered to have got again within the limit of his own immediate country) informed me, some wild cattle had long been roaming at large, and I felt desirous of ascertaining what had attracted them to the spot. In 7 or 8 miles we were upon their tracks, amongst numerous small rushy lagoons and swamps, in the midst of which were three small open lakes of good permanent water, which seemed to have been their particular resort. The tracks were very old, none of them having, to all appearance, been made within the preceding twelve months. It is, therefore, needless to say we saw none of the animals, the total number of whom we now learn did not exceed three. The lakes and lagoons, here alluded to, form part of an extensive chain, which occupies the lowest level in a wide valley formed by the northern slope of the sea-coast hills. These hills are of a limestone and sandy formation, and probably retain much of the drainage on its way to the sea, as fresh water is always to be found among the sand-hills of the sea-coast abreast, by scraping a small hole in the sand.

Before proceeding further westward I made one more visit to the neighbouring sea-coast, for the purpose of examining its

formation, being greatly prompted to this step by the alarming illness of one of our best pack-horses (Smiler), now stretched out on his side beyond our power of relief; for, in the first place, we could not decide with certainty what was the matter with him; and, in the second, we had no horse-medicines with us. Leaving him under the best treatment we could devise, we proceeded, mounted, to the bench as far eastward as the "Smooth Rocks" lying westward of Cape Knob. Here a steep granite head projected southward towards the rocks, and from its summit I observed a small dry rock, not laid down in any existing chart, about halfway between Smooth Rocks and the nearest trend of Cape Knob, or about $2\frac{1}{2}$ miles from each. The sea appeared perfectly clear and deep all round it, and, from its lying low, and being apparently not larger than a large boat, would be dangerous to a vessel making free with the shore in the night. At this rocky head I had again an opportunity of observing the remarkable geological formation which had been so conspicuous in the northern part of Bremer Bay, and noticed that, while the head itself was composed of hard compact granite, it was overlaid on the western side by brown calcareous sandstone, adhering with the tenacity of a strong cement, and mixed with many petrified roots. Horizontal cliffs of the same kind of sandstone extended behind the beach eastward.

Returning W. along the beach it was found to be fronted by a ledge of flat rocks even with the water's edge, against which the sea broke heavily during a fresh S.E. wind, and created occasionally a smooth shelter within for boats. In this limited space of 20 to 60 yards wide, and 6 to 10 feet deep, shoals of fine salmon were swimming about, but would take no bait.

A little further W. the route lay across one of those extensive sheets of bare sand prevalent on all sea coasts, where the low white sand is kept so continually in motion by peculiar eddies of the prevailing winds, that vegetation fails in its struggles to maintain even a scanty existence upon them. Here the process was going forward in full force, and the sand-hillocks undergoing a rapid change of position by the force of a strong S.E. wind. The entire "sand patch" was in motion, and enveloped in a thick cloud of sand, moving along with as much facility as smoke, and gaining only fresh impetus by the perpendicular resistance it frequently encountered. To move at all amongst these animated sand-heaps with our loaded horses seemed at first a proceeding of rather doubtful issue, on account of fancied quicksands; but on Bob's assurance that it was a safe road, always used by the black fellows to avoid the adjoining rocky scrubby country, we advanced into it, and found the footing tolerably firm throughout its whole extent of 3 or 4 miles. In that space our route sometimes lay

over broad sheets of white limestone rock, of that peculiar oolitic formation which embraces the appearance of large roots of trees; and amongst these rocks would occasionally appear one solitary plant or bush, struggling for existence against the overwhelming sands. Thus had evidently all the adjoining land been formed, and the process seemed in rapid continuation.

While traversing that part of this dreary waste which borders on the sea-coast, we came suddenly upon the skeleton of a human being, reposing upon a broad limestone sheet, about 200 yards behind the beach. Our native immediately explained that they were the remains of one of three seamen, who had quitted a Hobart Town whaler some 18 months ago, in the vicinity of Middle Island, for the purpose of walking into Albany, a distance fully 350 miles at the shortest. Why these men quitted, or were *suffered* to quit, their ship thus, on so inhospitable a coast, it is unnecessary here to remark on. The only survivor of the three, who was recently in the employ of Mr. Cheyne at Cape Riche, declared that they were landed with their own consent, supplied by the captain with as much provision as they chose to carry, and with a musket and ammunition;—that, after a long ramble, they became much distressed for fresh water, and at length separated to search for it more inland, agreeing to rendezvous at a certain hill, then in sight in advance;—but they never did so rejoin or see each other, and that he alone survived the fearful journey. The natives seemed to have been fully aware of the death of the other two, and ascribe it to actual starvation and exhaustion, disclaiming most strongly having used any personal violence, but, on the contrary, having endeavoured to assist the only one of them they saw before his death, who had, however, through fear or distrust, invariably pointed his gun at them when any one ventured to approach him. The unfortunate man now before us was said to be one of them,—the other lying somewhere amongst the sand-hills to the E., in a spot which our native did not profess to know. He was of rather short stature,—had on the remains of a coarse white shirt, blue serge shirt, and moleskin trousers;—one blucher boot, with a foot in it, was detached a few yards, and the other lay near it, showing, with other evidences of severed limbs, that the body had been, after death, attacked by wild dogs. Two of these animals, of large size, were seen near the spot feeding on a piece of whale-flesh, and Mr. Gregory got a long rifle-shot at them, but they succeeded in getting clear off. Any attempt to describe the features or person of the unfortunate man before us would be perfectly useless, the face and hair having been totally destroyed, leaving the scalp still on the skull, and some parchment-looking skin stretched over the skeleton of the body. After ascertaining that no marks of personal violence

appeared on those parts of the head and body capable of showing any, the remains were collected and removed to a neighbouring hollow, where we built over them a pile of limestone rocks 6 feet long and 3 feet in height, with a large slab at the head, and left the poor fellow to repose near the spot where he had so miserably terminated his fatal journey. The heap will, doubtless, soon be covered by a hillock of sand, and become a collection of petrified bones. The position is about 3 miles N.N.W. $\frac{1}{2}$ W. from the Smooth Rocks W. of Cape Knob.

The sun being now very low and the dreary "sand patch" yet to be traversed, we wended our way slowly onwards amongst its living hillocks, remarking on the sad spectacle we had just witnessed, having in all probability been occasioned chiefly by the want of water, which was anywhere to be had in abundance within a stone's throw, by scratching a small hole in the sand. This presence of fresh water in the large sand-drifts of the sea-coast has often been observed by travellers, but never satisfactorily accounted for, nor can I assign for it any cause more rational or probable than its being the drainage of the back country through those caverns and hollow ways which, in limestone countries, so much abound.

Passing through much good grass amongst peppermint trees and short steep sand hills, we reached our camp before it was quite dark, and I observed the latitude of the clump of large yait trees in which it was situated to be $34^{\circ} 24' 29''$ S., three miniature woods of the same description extending in a line from it to the N.N.W. about 1 mile apart. Our horse, Smiler, was somewhat better, but still gave cause for uneasiness.

Next day we proceeded W. along a beaten track of the natives, behind the sea-coast hills, where the land lay low, open, and for several miles nearly level, with small clumps of yait trees and rushy lagoons. At the end of 10 miles we descended the steep shore of the estuary which receives the Pallinup river, and crossing its dry sand-bar, which was only 50 to 60 yards across, encamped 2 miles up its S. shore, where we found abundance of excellent grass, and tolerable water by digging near the shore of the estuary. The latter was at this time very full; the water in it nearly salt, and grass scarce on its lower part. Poor Smiler having been left behind on the opposite side of the bar, standing in the estuary up to his saddle-girths, unable to move another yard, Messrs. Gregory and Ridley brought him into camp late in the evening, somewhat revived by his refreshing halt. It was, nevertheless, but too evident that without further rest he would be quite unable to accomplish the remainder of his journey, or even to reach Mr. Cheyne's establishment at Cape Riche, although not more than 20 miles distant. I therefore availed myself of

this necessity for a halt to examine the Pallinup river upwards, as it was crossed hereabouts by the line of direction taken by the shales from the vicinity of West Mount Barren. About our camp the granitic stratified rocks preserved the corresponding direction of $W. 18^{\circ}$ to 25° S., and had a dip to S. 25° E. of about 70° ; besides which our hopes were further raised by observing an out-crop of red sandstone, with varieties of a lighter colour above it, and by a recollection that this was the river on which we had first noticed so many red and yellow cliffs about 12 miles higher up, on the 18th of November last.

With four of the best horses, therefore, the country was examined upwards one day and down the next, on which occasions some good grassy land was seen on the river, which swept in fine long reaches, broad, deep, and open for at least 8 miles above our camp, and showed occasional out-crops of white and red sandstone; but neither river nor estuary showed any coal shales on their southern bank, and the opposite shore was not accessible to us. Towards the lower part gneiss or stratified granite was the prevailing rock, in close connexion with white and red sandstone. Near the sea other sandstones appeared of a calcareous nature, overlaying the granite-gneiss rocks, and ranging in long horizontal strata, from 50 to 150 yards behind the beach. The hills on the eastern side of the bar are entirely composed of such rocks, covered over with loose sandy soil; but on the opposite side they speedily rise to granite hills of greater elevation, and terminate very abruptly to the eastward at Point Irby, or, as the sealers are in the habit of calling it, "Groper Bluff." This name has been applied by them in consequence of the locality being much resorted to by a large species of rock fish, weighing from 30lbs. to 100lbs., which they have named Groper, in consequence of its feeding among the rocks, and detaching from them large limpets, sea-ears, &c., with its stout long teeth, resembling those of a pig. We caught one weighing about 40lbs., and found it of a dingy black colour, short, sturdy, and very strong, with large black scales, and pointed head. It was well supplied with fins, and had soft protruding lips or gums, adapted to its peculiar mode of obtaining food. It proved excellent eating, very gelatinous and nourishing. Some wild ducks and duck-eggs were also added to our larder, the nests being found among the low bushes, from 100 to 300 yards back from the river's bank.

On the morning of the 7th January every surrounding object beyond 10 yards was completely obscured by the densest fog I have ever seen in Australia. Its appearance at that time was rather inopportune, as our poor horse Smiler was nowhere to be found, and we began to fear he might have stumbled into the estuary from weakness, and been drowned. He was at length dis-

covered lying down in a small thicket, and was brought into camp in a very weak state, notwithstanding his recent rest. Being nevertheless in hopes he would be able to accomplish the remainder of the journey to Cape Riche, now amounting only to 15 miles, we commenced, so soon as the sun had acquired sufficient power to dispel the fog, and proceeded up a steep rocky valley to the S.W. Passing northward of the high granite ridge which extends westward from Point Irby, at the end of $2\frac{1}{2}$ miles the horses were watered at a permanent spring of good water, called Nōondeip, situate amongst granite rocks, in a water-course descending to the south-westward. A mile beyond this brought us out upon the scrubby coast hills overlooking a snug little boat harbour at their feet, from which the extremity of Cape Riche bore S. 17° W. It was formed by a low rocky point on its S. side: its sandy beach was open to easterly winds; and the sea broke heavily upon a detached covered reef, which lay to the southward of it, 1 mile from the shore. Passing up the steep rocky valley of a small water-course which fell into this little cove from the westward, the travelling was very rugged and bad for nearly 2 miles, when the beach at length became practicable, and our horses felt much relieved by getting on to it. After scrambling over two or three rocky sandstone cliffs which were lashed at their bases by a heavy surf, and crossing several small water-courses with beds of the same description, we at length reached the mouth of Cheyne's Lulet, and were surprised to find it open, with a salt stream 10 yards wide and 2 feet deep, running strongly out. Our approach having been observed, we were met here by the worthy owner of the property, Mr. George Cheyne, who showed us how to avoid some quicksands in crossing, and then welcomed us to his hospitable abode with his accustomed kindness and cordiality.

After an absence of 86 days, which, to our weak and worn-out horses in particular, had been a period of almost unremitting toil and privation, they now once again revelled in the enjoyment of good corn and rest, and, with the exception of Smiler, rapidly recruited their exhausted energies.

Here we remained four days, during which the horses were re-shod; saddles, bags, and clothes were repaired, and every preparation made for our return to the Swan, with provisions completed for 20 days. Every opportunity was taken of adding to my store of angles and other useful observations for my survey of the country; and for several hours on two successive days I watched from Cape Riche, and from the high land over it, for a covered reef of rocks which I was informed had been frequently seen by vessels 3 miles S.E. by S. from the cape. Although my vigils were both during and after a fresh breeze, when this danger might be supposed to be visible, I could perceive no appearance of it with a good tele-

scope, but have nevertheless no reason to doubt its existence. The latitude of Mr. Cheyne's large barn was $34^{\circ} 36' 31''$ S.

As the water on the face of the country was now fast drying up, or becoming too salt for use, I hastened our preparations so as to have everything in readiness on the morning of the 7th January; but it was then found that our native had become tired of the service on which he had been engaged, and had gone to re-join his tribe. Finding it impossible to replace him without much loss of time, I had to abandon my intention of taking a new route to the westward, and through the middle of the Stirling Range, as all parties agreed in assuring me that fresh water was then extremely scarce along that line, and could only be found by the aid of a native.

On January 7th we took leave of our hospitable friends, Mr. and Mrs. Cheyne, to whom I felt greatly indebted for their kindness in facilitating all our arrangements; and leaving poor old "Smiler" to be recruited and forwarded on (as he was then so reduced as to be scarcely able to keep his legs), we proceeded along the beaten sandal-wood track on the eastern side of the Stirling Range, the remaining nine horses being much revived.

Encamping on the 9th at the spring of Pöilyenup, near the Pallinup river, we were there joined by four teams engaged in carting sandal-wood to Cape Riche, for shipment to China; and next day we proceeded up the river, passing through much good grassy country in its valley and various tributaries.

The branches of this river are numerous, and come chiefly from the eastward of N.; but as I wished to make for the military post at Kōjomup, we followed up what appeared to be the main stream coming from the N.W., and in 12 miles reached a place called Myerup, where Mr. Maxwell had a sandal-wood cutting station, at a good spring, and amongst fine grass. Here the beaten track terminated, and I could gain no information relative to water in the country in advance, but was fortunately enabled to engage a native to accompany us, and under his guidance followed up the river on the following day. The latitude of Myerup was found to be $34^{\circ} 8' 57''$ S., with Ellen's Peak bearing S. $21^{\circ} 15'$ E., and the Peak of Toolbrunup S.W. by S.

Our next bivouac was at some large pools called Kybelup, 11 miles further on: the intermediate space being grassy in the river's bed, but scrubby on extensive open downs immediately behind the valley. Shortly above this we quitted the Pallinup, coming from the N.W. in a rocky granite bed, containing pools of water nearly fresh. The grass in the river's valley had by this time depreciated much, both in quantity and quality, and, as we proceeded westward, entirely disappeared in a level sandy country, covered with low scrub and brushwood. In $7\frac{1}{2}$ miles

W. by S. from our last camp, we watered at Cārramup, a spring of good water surrounded by a small patch of grass, at this time very dry, growing in tolerably good soil. White gum and yeit were also now frequently met with, and at the end of 5 miles of grassy forest land, extensively fired by the natives, we encamped at a fine open lake of good water, 200 yards in diameter, called Tool-brun. Ducks were very plentiful about it, and the country around teemed with kangaroo and emu. Here we met the families or small tribe to which our native guide belonged, and by whom we were welcomed to their ground. These and all the aborigines we fell in with after leaving Cape Riche were afflicted with the prevailing whooping cough; they seemed, however, to adopt no precautions against it, and, on the other hand, the disease had visited them but mildly. Latitude 34° 6' 55" S.

Next day we travelled through mostly forest country, in plains well grassed, and had abundance of good water, camping at the end of 11 miles upon the Gordon River, in large pools of fresh water. Here again we had to repeat remonstrances at the day's march being so short, but all in vain: our guide (who richly deserved the appellation of "Donkey," by which he had been distinguished by the white people) persisted in saying the water in advance was all salt and bad. Latitude 34° 2' 34" S., and native name Kylobunup.

Throughout the 18th of January we travelled over grassy forest country, intersected by many small tributaries to the Gordon, in some of which were pools of fresh water, and in all of them good grass. Finding us resolved to proceed without them if they did not push on, our guides grumbled along at a somewhat better pace this day, and accomplished 21½ miles N.W. by N., halting at a small pool in a watercourse winding to the S.W. in latitude 33° 48' 2" S. They called the place Gnw-yillup.

On the 19th, being personally unwell, and quite unable either to walk or ride, I did not move away until 4 p.m., when we made a short stage of 5 miles, and soon after sunset reached a deserted sheep-station of Mr. Hassell's at Cūrralup, on the left bank of the Beaufort River. The grass here was extensive, and tolerably good; and the water of the river fresh, in large pools 30 yards across, winding to the N.W. A cart arrived soon afterwards to remove the contents of the hut, preparatory to Mr. Hassell transferring his principal station to the fine country we had discovered on the 22nd of October, at Jēer-a-mung-up, on the Fitz-Gerald. This arrival at the haunts of civilised man put us in possession of various particulars relative to passing events in the colony, and made us acquainted for the first time with the result of Mr. A. Gregory's recent expedition towards Shark's Bay—of his discovery of a lead-vein on the Murchison River—and of the Governor

having been wounded by a native, on a visit subsequently made to the spot.

Proceeding S.W. along a beaten road, next day, over undulating forest country covered with indifferent grass, at the end of 7 miles we crossed another branch of the Beaufort, in a soft dry bed 70 yards wide, filled with brushwood; and, in $4\frac{1}{2}$ miles more, reached another of Mr. Hassell's sheep-stations, at a brackish spring called Wäckelup, or Joseph's Well. Here the overseer was preparing to remove his flock also to the Fitz-Gerald, the country around having been extensively burnt by the natives, and the grass nearly all destroyed for the season. In 4 miles N.N.W. from this station we reached Kōjonup barracks, and were met with every desire on the part of the small military party stationed there to render us any service in their power. By five stars on the meridian the mean latitude of the Kōjonup barracks was found to be $33^{\circ} 49' 20''$ S.; and two azimuths gave the magnetic variation $3^{\circ} 48'$ westerly.

Remaining at our camp on Sunday, the 21st of January, I performed Divine Service to our little party, according to the custom invariably followed throughout the journey whenever circumstances permitted; and next morning, having discharged our natives, we proceeded along the post-road towards Bunbury. The route lay amongst rocky forest-hills, and both grass and water were in sufficient quantities for supplying our wants; but, notwithstanding this, our horses continually cropped from many bushes on their way, and from none more eagerly than the poisonous plants which are so fatal to cattle and sheep. Our previous belief that horses could partake of these plants with impunity had now to be corrected; for, after crossing the Blackwood at 24 miles from Kōjonup, winding through a hilly country, nearly all of them showed such alarming symptoms of weakness and lethargy, that on the morning of the 24th I was glad to find a suitable place at which to halt them for the remainder of the day. They were fortunately somewhat relieved by the short respite this afforded them; but it was not without some difficulty that they were got on another stage of 16 miles next day, to a branch of the Collie River, at this time in fresh pools, in latitude $33^{\circ} 34' 25''$ S.

At 12 miles from the Blackwood River the white gum and mahogany forests began to show some very good timber of the latter description, which increased both in quantity and quality as we proceeded N.W., improving as the white gum became replaced by red, and the trees grew closer, straighter, and better able to resist the pernicious effects of the periodical bush-fires.

On the 26th we passed about 20 miles N.W. by N. to latitude $33^{\circ} 27' 39''$ S., through forests of the finest timber that could be

desired for naval and ordnance purposes; the splendid straight mahogany or jarrah trees, growing within 3 or 6 feet of each other, reaching to the height of 50 and 80 feet without a branch or blemish, and apparently quite sound. The red gum is equally perfect, although not so good for naval purposes as the jarrah, on account of its numerous gum veins, which would appear to weaken the timber in the solid mass, and to render it unfit for any purpose requiring the exclusion of water. It is nevertheless highly prized by the colonists for various purposes about a farm, and would apparently answer well for ships' beams, being of immense size, very hard, tough, and straight. It is, however, more subject to decay than the jarrah, which, in its sound state and free from sap, is not even assailable by those formidable and universal destroyers, the white ant and sea worm. The best timber is found in the most hilly country, and the greatest facilities are at command for the construction of roads through it, long straight timber of any required dimensions being on the spot for bridges and viaducts.

Eight or nine miles, on a devious course to N.N.W., through hilly country equally practicable, and equally well timbered, took us to the Ferguson; after crossing which, by a very good small bridge, the road became, and continued for $3\frac{1}{2}$ miles, so steep and severe amongst sharp abrupt hills, as to be totally impracticable for a loaded team. After this, the country opened out and became more level, the hills were left entirely behind, and a good easy road might be made throughout the intervening distance to the shipping port of Bunbury.

Having now reached a located part of the colony, we passed by beaten tracks homewards for the benefit of our weary horses, and on the evening of the 2nd of February arrived at Perth, after an absence of 149 days.

During this period the expedition traversed nearly 1800 miles of country; and although, from the nature of the interior, no great addition has been made to the amount of good land available to the colony, much useful geographical knowledge has been acquired relative to a portion of this continent hitherto entirely unknown. Independent of all other considerations, and as being more immediately and practically beneficial to this colony, *the discovery which has been made on this occasion of coal in two available situations*, at this particular juncture, is alone a sufficient recompense for all the outlay and labour bestowed; especially if my anticipations are realised, that this valuable mineral may be traced even nearer than I found it to the anchorage in Doubtful Island Bay.

It is also to be hoped that, as one of the most valuable and most readily available sources of wealth in this colony, the superb naval timber which I observed in such inexhaustible quantity in the forests behind Bunbury, will not much longer be suffered to remain there

idle, but that, on the formation of practicable roads, the axe and saw will shortly resound amongst it, to the mutual advantage of the colony and of its parent country.

The pleasing duty now only remains to me of reporting my entire satisfaction with the praiseworthy conduct of Messrs. Gregory and Ridley, and of privates Lee and Buck of the 96th, who were associated with me on this expedition. To the cheerfulness and alacrity with which each and all were ever at their respective posts, putting forth their best energies and exertions to overcome formidable obstacles, and to further the objects in view, is mainly to be attributed, under Providence, my successful accomplishment of the duties pointed out in his Excellency's instructions; nor can I speak too highly of that spirit of steady endurance and determination with which they met unavoidable privations, and faced difficulties and impediments of no ordinary description, during our long and toilsome journey.

II.—*The Settlers' Expedition to the Northward from Perth, under Mr. Assistant-Surveyor A. C. Gregory.*

We could not do justice to the enterprize and exertions of the gentlemen who discovered the new tract of good land to the northward, in any other way than by giving Mr. Augustus Gregory's Journal entire:—

Colonial Secretary's Office, Perth, Aug. 28, 1848.

Sir,—I am directed by the Governor to inform you, that you have been appointed to direct the exploring expedition about to proceed northwards, on account of the zeal, energy, and enterprising spirit that have been exhibited by you on other occasions, and called into action with credit to yourself and advantage to the public interests. The party under your direction, it is intended, should proceed northward as high as the Gascoigne River.* It is advisable to approach that river from the eastward, about 100 miles from the coast, after proceeding in a north-easterly and northerly direction from the country abreast of Champion Bay, it being desirable that part of your route which lies farthest in the interior country should be first accomplished, in order to avail yourself of the best chance of finding water.

You will examine that river as far as it may be practicable to do, with the view of tracing its course, of ascertaining, if possible, the nature of the bar at the mouth of it, and the question of its being practicable for boats, to what distance from the bar, and the nature of the soil in the vicinity of either bank.

After having examined thus the Gascoigne River, you will proceed in a southerly direction and examine the river, as yet unexamined, about 40 miles farther S., that flows into Shark's Bay, the mouth of which was seen by Captain Grey, and is placed by him at Point Long.

Should you proceed along the sea-shore for any distance, you will pay as much attention as your limited means will allow you to do to the peculiarities of the coast, and of any estuaries, creeks, or roadsteads that may present themselves.

You will bear in mind, that the primary object of this expedition is the examination of a new tract of unknown country for practical purposes, by practical men—

* The Gascoigne River flows into Shark Bay, in latitude 24° 35' S.

that, in fact, the discovery of new land of an available kind for pasture has become a thing to be desired, of paramount importance, and an object in the attainment of which the interests and perhaps the fate of this colony depend.

You will thus conduct your expedition with the view of promoting this principal object to the best of your ability. But it is hardly needful to observe to you, that this chief object may be promoted and attained without neglecting to observe the geographical, geological, and mineralogical features of the country you pass through; its productions, animal and vegetable; and the character, dialects, and customs, to some extent, of the aboriginal tribes you may fall in with. You have been so frequently employed in exploring expeditions, though of minor importance perhaps to the present, that you must be well aware it is no less impolitic than cruel to come into actual collision, wantonly, unadvisedly, and maliciously, with the natives; and, on the contrary, that it is no less humane than politic to leave no angry recollections of white people, where the footsteps of travellers, however "few and far between," must be expected to follow yours.

Should your route, either in proceeding on the expedition or returning, be in the direction of that part of the Irwin River where for the discovery of coal the colony is indebted to yourself and brothers, it would be desirable that you should devote a short time to the examination of the locality where it was first found; to excavation, to some moderate extent, in the vicinity of the veins of coal of most promise; and, above all, to the ascertainment of the fact if coal crops out, or if there be in the soil any indications of it between the place where the mine was discovered by you in 1846 and the sea-shore, in that interesting space of about 28 or 40 miles, or to the northward of it in the direction of Shark's Bay, where Dr. Von Sommer thought the coal-seam of the Irwin might again make its appearance.

In the event of accident, occasioning loss of provisions and beasts of burden, and a necessity arising for a prompt return to the settled districts, you will bear in mind the causes of impediment on the march which proved so disastrous to Captain Grey's party on its return from Ganteboume Bay; the want of vigilance at night manifested in another expedition in the murder of Lieut. Eyre's European companion; and the want of caution, forgetfulness of the nature of barbarians, and the facilities for ambush afforded by a wilderness of trees and jungle, that have led to injuries fatal to life, as in the case of Mr. Cunningham in Sir Thomas Mitchell's expedition, and of two of his companions at another time; and in some instances, as in those of Capt. Stokes and Capt. Grey, that have led to results all but fatal to the explorers and their expeditions; injuries suddenly and unexpectedly inflicted on individuals straggling from the main body of their party, or venturing considerable distances in advance of it.

You are to bear in mind that it might be of some advantage throughout your expedition to keep a register of the depths at which water has been found by you, and of those depths to which you have penetrated in vain for it.

It will be requisite that you should ascertain the course of rivers of any magnitude, and direction of chains of high land, that you may meet with, and follow the same to some extent—at least wherever appearances may lead you to expect improvement of soil, a richer country, or one indicating mineral productions.

In the event of occurrences of unexpected disasters, impediments, and unavoidable accidents, arising from loss of provisions or of horses, or of any injury to the health or strength of the party, rendering it utterly impracticable for the expedition to proceed as high northward as Gascoigne River, your discretion then supplying whatever you may be unprovided for in your instructions, you will explore as far as it is possible for you to do, on your return, the country N. of the settled districts of York and Toodyay; so that something of utility may be accomplished, and the great object for which this expedition was prepared may not be wholly frustrated.

I am further to add that his Excellency's best wishes accompany your party, and that the success of the expedition, and the return of all engaged in it in health and safety, will be hailed by him with very lively satisfaction.

I have the honour to be, Sir,

Your obedient servant,

To A. Gregory, Esq., Perth.

B. R. MADDEN, Col. Secretary.

Perth, November 20, 1848.

SIR,—I have the honour to transmit, for the information of his Excellency the Governor, the following outline of the proceedings of the exploring party to the northward which his Excellency has been pleased to place under my direction. I regret that we have not succeeded in reaching the Gascoigne River, which your instructions for my guidance pointed out as the ultimate object of the expedition; but I trust that our attempts to render the expedition serviceable to the colony have not proved unsuccessful, especially as the result has been the discovery of several fine portions of good grassy land near Champion Bay, which, with the more minute examination of the country in the vicinity which had been previously discovered, will render available a tract of pasturage sufficiently extensive to relieve the present overstocked districts; the estimated quantity of land suitable for depasturing sheep being about 225,000 acres, exclusive of 100,000 acres on the Irwin, the greater portion of which however is better suited to agricultural purposes. The observations I have had the opportunity of making during this journey have confirmed my previous opinion, that, could the party have started in July instead of September, the chief obstacle to our progress—the want of water—might have been avoided; and although there would have been many minor difficulties to encounter, I feel assured that the same zeal and energy which enabled my party to contend so long with the obstacles which opposed their advance to the Gascoigne River, would have ensured their success in a more favourable season. The gentlemen who formed my party have my sincere thanks for their prompt and energetic co-operation on all occasions; nor can I omit to mention the cheerful and trustworthy conduct of private W. King of the 96th regiment. For minute details I beg to refer to my journal and the plans of my route, which I am plotting.

I have the honour to be, Sir,

Your obedient servant,

A. C. GREGORY, Assistant-Surveyor.

The Hon. the Colonial Secretary, &c.

JOURNAL.

Sept. 2, 1848. Started for Toodyay, with Mr. C. F. Gregory and 5 horses, for the expedition to Shark's Bay; bivouacked at Warriloo.

3rd. Proceeded to Toodyay, where Messrs. L. Burgess, J. Walcott, and A. Bedart joined on the 4th, bringing 6 horses with them. Having had the horses shod at Ferguson's, we continued our journey to Mr. Lefroy's station near Helana, which we reached on the 7th. The following day the cart, with our provisions, &c., arrived, accompanied by private W. King. Having obtained another horse from Mr. Lefroy, on the 9th we left Welbing, with 10 pack and 2 riding horses, carrying 3 months' provisions, &c. Steering N. by W. for the first 20 miles, generally grassy, we entered the extensive grassy plains which occupy almost the whole country between the Moore and Irwin rivers. The rainy season having scarcely ended, we found both water and grass for our horses every night; and, not meeting with any serious impediments, we reached the upper part of the Arrowsmith Brook on the 13th. Here the country improved, and the valleys, in which the stream takes its rise, were estimated to contain about 10,000 acres of tolerable sheep pasture. Early the ensuing day we entered the Irwin plains; crossing the eastern branches of the river, we encamped, on the 15th, on the northern branch, three-quarters of a mile below the spot where the coal was first discovered. The Irwin plains presented a very beautiful aspect, being covered with rich grass and vegetation; the soil is generally good, but most of the grasses being of the annual species, would not afford good pasturage in the summer, and in consequence they are better suited for agriculture; while the open character of the country would render clearing for the plough a matter of little expense. While dinner was preparing, the horses, being herded, suddenly started off at full speed, in consequence of a large stone rolled down by one of the party in ascending the hill. Two of the remaining horses were immediately saddled, and Mr. Burgess and myself started to catch them; in about a mile we came up with them at the foot of an almost perpendicular cliff; on seeing us, they started off, and, scrambling up the rocks

like goats, left us far behind; we did not overtake them for several miles, when with some difficulty we captured one, but had the mortification of losing one of the saddled horses in exchange. Leaving the captured horse in charge of Mr. Burges, I followed the rest; caught another after a smart ride of 3 miles, but it was not till I reached the East Irwin that I could again overtake the rest, when, favoured by the steep bank of the stream, I succeeded in securing our transient steeds. It was now dark, and being unable to manage 3 horses by myself, I tethered several of the wildest, and started with 2 of the best for the encampment, 10 miles distant, which, owing to the nature of the country, I did not reach till midnight. Mr. Burges had arrived about an hour previous with the horse first caught. Light showers in the morning.

16th. Messrs. Bidart, C. Gregory, and J. Walcott started to bring in the horses; the rest of the party was employed in repairing damages of the harness, and at 3h. the party returned with the horses. Slight showers in the morning.

17th, Sunday. Light clouds from the S.W.; thunder; rain in the evening. Read prayers.

18th. Left the bivouac 8 h. 15m., and followed upwards the main branch of the Irwin to the N.N.E., through a steep and rocky valley, the sandstone hills in some parts approaching the river, so as to render it necessary to cross frequently with the pack-horses. The very level character of the summits of these hills gives the country the appearance of having been once a plain, through which the valley of the stream has since been worn by the action of water; the upper stratum is a hard red sandstone, resting on a softer rock of a sandy or clayey character, beneath which the shales and rocks belonging to the coal-formation show themselves, lying in unconformable beds, and often at a very high angle. At 9h. 25m. the stream divided into two branches, that to the E. being the most considerable; at this spot the sandstone ceased, and we commenced ascending the granite range, the direction of which was about N.N.W. The soil was poor and stony, producing a little feed for stock, but it could scarcely be made available, as the country is completely covered with thickets of acacia of small growth. At 4 p.m. bivouacked on a small watercourse running through a level grassy flat, bounded on both sides by thickets of wattle.

19th. At 8h. 15m. steered a nearly N. course, through a country of the same description as yesterday; crossed several small gullies trending W., in some of which a little water still remained; at 4h. 20m. halted for the night at a brackish pool in a small gully trending W.

20th. Started at 8h., continuing a northerly course, over a similar description of country as during the past two days, crossing three large gullies coming from the eastward, but apparently near their source. At 3h. 45m. halted on a large stream-bed, with a few brackish or rather salt pools in its sandy channel, which was in some places nearly 100 yards wide; from our encampment we observed a very remarkable peaked hill, distant about 20 miles, and from its outline conjectured it to be composed of the same vein of trap-rock as that which forms similar ranges farther to the eastward.

21st. The scarcity of water and the very level appearance of the country to the northward of our bivouac, added to the general denseness of the thickets of acacia and cypress, rendering a continuance of a N. course inadvisable, we steered N.W. from 8h. 30m. till noon, when we ascended a scrubby sand ridge, from which we had an extensive view; neither hill nor valley could be discovered to the N., E., or W.—nothing but one immense sea of dense thicket of acacia and cypress was visible in these directions; the course was therefore changed to W., and continuing it without much alteration over a succession of low ridges of drifted sand, the valleys being filled with dense thickets, until 6h. 20m., when the approach of night compelled us to bivouac in a small patch of gum-forest, which also afforded a few scattered tufts of grass for our horses. Although this was the lowest spot passed in a distance of more than 10 miles, it was so completely dried up and parched, that a search for water was fruitless, even by digging; the scanty allowance of very brackish water in our kegs was therefore much relished by the party.

22nd. The night having been cloudy, and a strong breeze preventing any dew, our horses were not much refreshed; we however started at 7h. 45m., and steering nearly W. till 9h. 15m. through a succession of dense thickets, high scrubs, and

thorny bushes, we entered open sandy downs, and changed the course to S.W., with the intention of making the Hunt River, should we not find any water nearer, when, almost hopeless of procuring this essential element before the next day, we unexpectedly came to a native well in the centre of the sandy plain; here we bivouacked at 5h. 40m., but, from the loose sandy soil in which the well was dug, we could not obtain more than about 2½ gallons of water for each horse, the sides of the well continually falling in. Strong breeze from the N.W. and several light showers in the evening and night.

23rd. Having completed watering the horses, we left the well at 9h. 50 m., and steering about N.W. over undulating sandy downs, covered with coarse scrub and patches of dense thickets, at 2h. 15m. entered a small gully trending N.W. The country improved, but was so thickly clothed with wattles as to render travelling difficult; a few patches of grass were seen in some small watercourses, in which a little water remained. At 4h. 40m. bivouacked on a large gully trending northwards, with several small pools of water in a rocky bed of gneiss, containing numerous small garnets. Strong breeze from the N.W. and slight showers.

24th, Sunday. Although the feed for the horses was not very abundant, yet the long marches they had encountered the last few days made it expedient to give them a day's rest to recruit their weary limbs. Read prayers. Strong breeze from the N.W. and slight showers during the day.

25th. Started at 8h. 27m.; passed over poor stony hills of granite formation and producing a little grass in tufts—the wattles growing so close together as to render travelling difficult and tedious. At 10h. 45m. came on a large stream-bed, which had scarcely ceased to run; the channel was 50 yards wide, the bed steep and rocky, and, where crossed, ran over a dyke of trap-rock, the water slightly brackish and in long shallow pools, with samphire on the banks. This stream must be the Murchison River, as no other was passed for 30 miles to the northward; the effects of violent floods were visible, but it did not bear the character of a stream rising at any great distance inland, nor did the nature of the gravel and sand brought down by it indicate a rich soil on its upper portion, as I did not see anything besides fragments of siliceous rock and garnet sand. The valley through which it runs appeared to be 5 or 6 miles wide, extending 20 miles to the eastward, flanked by sandy plains on both sides; a few patches of grass appeared in the lower parts of the valley; westward it seemed to contract and turn to the S.W., flanked by steep flat-topped hills of sandstone, resting on granite rock. Continuing N.N.E. up a small valley, we passed through wattle thickets till 1h. 40m., when we again ascended the level sandy table-land or plains, and changed the course to the N.; the scrub increased in density as we proceeded. At 4h. 25m. halted for the night in a patch of good grass, where the thicket had been burnt off by the native fires; the sandy nature of the soil rendered the search for water unsuccessful; we therefore contented ourselves with the allowance of one pint each.

26th. Left the bivouac at 7h. 15m.; course N.; the country more open; 9h. 25m. came on a large native well of good water in a slight hollow trending westward; having watered the horses and filled the kegs, continued our journey over sandy plains, covered with short coarse scrub; many hummocks of loose sand, covered partially with scrub, lay on each side of our track. At noon passed the last sandy ridge; before us lay an immense plain, covered with thickets, and not a hill or valley could be observed—the country seemed to settle into one vast level of dense and almost impenetrable scrub or thicket. At 1 p.m. entered it, and continued our route through it; although the bush-fires, which had burnt some large patches, greatly assisted us (4h. 15m.), not finding any grass, we steered W., but at 5h. 15m. were compelled to halt for the night in a dense thicket, without a single blade of grass or even scrub of any kind which could afford food for the horses; water it was hopeless to look for; and after a supper of raw bacon, damper, and a pint of water each, we retired to rest.

27th. At 7h. A.M. set out on a N. course; at 8h. 5m., finding the thicket almost impassable, I ascended a cypress-tree, where a most cheerless view met my sight to the N., E., and W.; not a break was visible—nothing but thicket in all directions, with scarcely an undulation of any kind; the view to the N.W. was most extensive—nearly 20 miles of thicket could be seen, with a surface as level as the sea. Not considering it prudent to proceed onwards, the thicket being too

dense to advance without the greatest difficulty, the saddle-bags being almost torn to pieces, and the horses quite worn out with continual exertions in dragging their packs through the thickets, we were compelled to return to the well passed yesterday morning. The country seen to the northwards was of too flat and sandy a character to give any hope of finding water or grass—and without these requisites, it would be incurring great risk of losing the horses, and of course defeating the object of the expedition; therefore, taking advantage of the partially cleared tracts of yesterday, we reached the watering-place at 4h. 30m.

28th. This day we employed ourselves in repairing our pack-saddles, which it was found necessary to restuff, as they had been padded with coarse rushes; the saddle-lags had been torn to pieces, and the repairs of these required more time than could be afforded in an evening's bivouac.

29th. Started at 8h. 35m.; pursued a general course of 310° , gradually ascending the sandy downs on the N. side of the valley for 3 miles; it then turned to the N. of W., and we again descended, and found the bottom occupied by a narrow samphire flat, 50 to 100 yards wide, over which the water runs during heavy rains, but it was now dry, and in some parts covered with a thin crust of salt; 11h. 26m. passed a native well of slightly brackish water, amongst loose blocks of red sandstone; a small well was passed at 11h. 50m.; the samphire flat then changed to a small sandy channel, among large blocks of sandstone belonging to the coal-formation: in one place the slate also cropped out. Abundance of brackish water lay in small pools along the course of the stream-bed, which at 1h. changed its direction nearly W.; we followed it through a scrubby valley, with high hills on both sides, till 4h. 45m., when we bivouacked just below the junction of a small gully from the northwards, with a very remarkable sandstone hill about three-quarters of a mile S.; below this spot the valley trended to the S.W., and was bounded on the N.W. by flat-topped sandstone hills.

30th. Not being more than 10 to 15 miles from the sea, I steered N. 330° E. mag. Starting at 8h. 5m., and having ascended the high land, passed through a thick line of wattles and dwarf gum, growing on the eastern face of the limestone range, which forms the high barren range along this part of the coast. The country was covered with thick scrub, and some patches of gum and wattle thicket; about noon it was more open, and ascending an elevated sandy ridge, saw apparently a high range of hills extending N.N.W. as far as Shark Bay, and terminated by a very abrupt and detached hill; but the excessive refraction caused by the heated and nearly level plain which intervened more than doubled their real height. We descended gradually over a succession of sandy hills or ridges till 2h., when the lowest part of the plain was reached; we found it occupied by a small patch of spear-wood; the soil was hard dry clay, but on proceeding a little farther, we found a patch of moist ground, encircled by a ridge of sand; at one foot deep we found water, but in such small quantity that we could only obtain sufficient for ourselves, and should have had to wait at least two hours to have given each horse only one gallon. Proceeding onwards, in hope of finding a more plentiful supply, we found the country became drier and full of circular hollows, filled with fine clumps of green wattle and a little grass; in one of these we bivouacked at 5h., and dug 6 feet for water in red sand, but without any appearance of obtaining it even at double that depth.

October 1. This morning started at 7h. 35m., and steering N.W., in hope of finding water, at 8h. 40m. came on dense thickets of wattle, which extended at least 7 or 8 miles farther N.; we therefore turned W. to avoid them; at 9h. 30m. changed the course to 300° mag., and with great difficulty forced our way for 2 miles to a narrow strip of open ground; 40m. P.M. arrived at the foot of the range of hills seen yesterday—found them to consist of limestone and sand, covered with thick scrub; between the hills were many nearly circular hollows filled with thickets of wattles; although the bottoms of the hollows were at least 50 feet below the lowest part of the ridges around them, they were quite dry, and afforded no hope of water even by digging; the country northward appeared even less likely to afford a supply, so much required, as it seemed to consist wholly of limestone and loose sand, without swamps or watercourses; the nearest spot at which we could hope to find it in this direction was the S. part of Freycinet Harbour, distant, according to the charts, about 30 miles, and great doubt existed of the accuracy of it in this position (error having been found in some other parts of the coast-line); nor

was it certain that we could find water on the coast, in which case the loss of our horses would be almost a necessary consequence, several of them showing extreme fatigue. The circumstances of the case required a prompt decision; I therefore ordered an immediate return towards the last spot where we had seen water. The whole party felt convinced of the necessity of returning, though with the greatest reluctance to do so, as it seemed to put an end to almost every hope of reaching the Gascoigne River. We followed our route back, and halted at 5h. 30m. in a wattle thicket.

2nd. Left our uncomfortable bivouac at 7h. 30m.; steered S.E. Finding the horses scarcely able to travel from want of water, I took the strongest and rode over to the spot where we had obtained a little on the 30th September, to dig wells and have a supply ready, if it could be obtained in sufficient quantity; at 11h. arrived, and found the wells we had dug nearly dry; by opening several trenches down to the rock, which lay about 1½ feet below the surface, the water oozed in, and when the party came up, at 12h., there was about a gallon for each horse; taking off the packs, we commenced watering: 4 horses had received their small allowance, when it came to my horse Hob's turn; after drinking his share, he marched off at a smart pace, which somewhat surprised us, as he started in the direction of what we had supposed to be nothing but a tea-tree scrub; on following him, we found the horse drinking at a small shallow pool of water in a hollow in the clay. This was a very fortunate discovery, as the trenches filled with water so slowly that a full supply could not have been obtained that night, and the horses had been 66 hours without water.

3rd. This morning Mr. Burgess and myself started at 7h. 30m. in a north-easterly course, to ascertain the practicability of proceeding in that direction, taking two of the strongest horses. After riding four hours over an open, scrubby sand-plain, with circular valleys, we again fell in with thickets of wattles so dense that, although burnt by the native fires about four years previous, they would have been impassable for the packhorses; but, favoured by this circumstance, we penetrated the thicket in a S.N.W. direction for about 12 miles. From one small sandy ridge we had an extensive view, but of a most discouraging nature; the whole country was one vast plain, covered with dense thickets and scrub as far as the eye could reach, except to the W.N.W., where rose a high and barren ridge, which would not have been visible but for excessive refraction, as it must have been more than 25 miles distant. The plain was still dotted over with the remarkable circular hollows or valleys, which, by their extreme dryness, indicated a great depth of sandy soil, incapable of retaining water on the surface even for a short time, or any probability of our obtaining it by digging. We turned in disappointment towards the encampment, scarcely extricating ourselves from the thickets before it became dark. Having gained the sand-plain, we continued our return for several hours, steering by the stars, hoping by a night-march to avoid the scorching effects of the sun, which at this season renders travelling over an extensive sandy plain very fatiguing. Having been more than 11 hours in the saddle, we halted for the night.

4th. Started with the dawn, and pushing our tired and hungry horses over the plain as fast as circumstances would admit, arrived at the encampment before the heat of the day became excessive. During our absence two more water-holes had been excavated, and sufficient water obtained for the horses, but from the great evaporation it did not seem likely to last longer than three or four days: the hardness of the sandstone precluded our sinking the wells more than 1½ feet. The extreme aridity of the country—the absence of water in consequence of the sandy nature of the soil, which renders it impossible that watercourses should exist—the dense and almost impassable nature of the thickets of acacia and melaleuca of small growth, and the heat of the climate—all tend to prove the fallacy of attempting to explore this part of the colony, excepting during the wettest of the winter months. Under the existing circumstances, I considered it my duty not to lead the party into a position from which it would most probably be impracticable to extricate ourselves without at least losing some of our horses; and even difficulties of a more serious nature might arise, which would prevent the more complete examination of the imperfectly known country to the southward of our present position, more especially as a successful advance to the northward seemed impossible.

5th. Left the encampment at 9h. 10m.; steered N. 135° E. mag. over stony country, covered with coarse scrub; at noon passed a narrow strip of wooded grassy land, the soil being limestone and red loam. The country again became scrubby, and, descending an open valley, came on a small watercourse at 1h. 5m., trending S.; followed it S.S.W. At 2h. 15m. passed our bivouac of the 29th September, and turning S.W. along the stream-bed, at 4h. came on the right bank of the Marchison River, running through wide grassy flats, the stream forming large pools, some of them more than a mile in length; but, with the exception of the flats on each side the bank, the country is poor and scrubby, destitute of trees, and the hills high and rocky, consisting of red sandstone, those to the W. capped with limestone.

6th. The horses being much fatigued and nearly starved, having subsisted chiefly on scrub for the last two days, we determined to rest them for a few days, while we examined the river towards its mouth. I started with Mr. Bidart, and tracing the stream downwards to the S.W., reached the sea after a ride of six hours. Excepting the flats and a narrow strip of land on each side, the country was very indifferent, the hills being composed of sandstone and sand, covered with coarse scrub and a gigantic species of grass, the leaves of which, instead of affording food for stock, were a source of great annoyance to our horses, being armed with sharp thorny points, and was somewhat appropriately called "bayonet grass" by the party. The tide flows about five miles up the river, when it is obstructed by some slight rapids; although it seems shallow, and full of rocks and islands, I think it is navigable for small boats. Above the rapids the river is a succession of long reaches of water about 100 yards wide, and wide flats covered with reeds, the roots of which seem to form an important article of food with the natives. Many springs were seen on the left bank, but few on the right, the water of which was of excellent quality. After making observations of the bar, which appeared to be practicable for whale-boats in moderate weather if the wind be S. of W., we returned along the S. shore of the estuary, which is about $1\frac{1}{2}$ mile long and $\frac{1}{4}$ a mile wide; it does not appear to be of any great depth. My horse being quite knocked up, it was dark before we could reach a spot where we could obtain water and grass; having come to a convenient place, we bivouacked under a large overhanging rock, as it promised to be a wet night.

7th. At 6h. we were in our saddles, but owing to the rocky nature of the country did not arrive at the encampment till 30m. p.m. During our absence the party had been successful in fishing and shooting; a savoury mess of cockatoos, swans, and ducks, with fried fish, proved a welcome change to us, after living so many weeks on salt meat and damper.

8th. *Sunday.*

9th. The valley of the river being rocky and impassable above the camp, we crossed to the left bank and ascended the sandy table-land; steered about S.E. from 7h. 47m. to 11h., when we came on the stream in a deep valley formed by almost perpendicular red sandstone cliffs from 50 to 200 feet in height, broken at short intervals by enormous fissures (their general direction W.N.W., and nearly at right angles with the river), which time, with the action of water, had worn into impassable ravines, frequently extending more than $\frac{1}{4}$ a mile back from the river, and rendered travelling very tedious and unsafe, as it was requisite to avoid the thick scrubs covering the higher land. The course of the river now changed to nearly S., and preserved the same rocky and unapproachable character till 5h., when a break in the cliffs enabled us to descend into the valley, although with some difficulty and danger to the horses, which had to slide down the steep rocks at the risk of breaking their necks, which would have been the almost certain result of a single false step; but the descent being accomplished, they were rewarded by an abundant supply of grass and water, the latter from a large spring at the foot of the cliffs.

10th. While breakfast was preparing, Mr. Burges and myself examined the right bank of the river, and after a short search, found a practicable ascent to the top of the cliffs, and having cleared a way through the thicket of melaleuca on the bank of the river, returned to breakfast. At 7h. 50m. commenced ascending, and at 8h. 30m. reached the summit of the rocky hills, and steering about S.E. through a succession of thickets, rocks, yawning chasms, sand-hills, and scrubs, we attained to a fine grassy flat at 30m. p.m. The bed of the river here quite changed its

character, the sandstones giving place to granite gneiss, with dark trap dykes intersecting it in a N. and S. direction, the dip of the strata being to the W. at a very high angle, at times almost perpendicular.

11th. As this appeared to be a good spot for the formation of a depot, while we examined the upper portion of the Murchison. I proceeded up the river in company with Mr. Burges, leaving the rest of the party to guard the camp and attend to the horses. After one hour's ride, we came on our track where we crossed the river on the 25th September, the general course of the stream-bed being E.N.E., its channel averaging 100 yards in width, full of rocks, small trees, and sandbanks, with many shallow brackish pools of water, with the exception of one, which was both wide and deep, where we halted for two hours to rest the horses; few of the pools seemed likely to last through the heat of summer. At 1h. we came on a party of natives, five of whom came up to us, following us for some distance. As they seemed to prefer mimicking our attempts to speak the York dialect to using their own, we could not obtain much information; they carried kyllies and downks, but had left their spears and shields with the rest of their party, who did not make their appearance. At 3h. passed several ridges of red sandstone rocks, the strata dipping to the E.N.E. at an angle of from 20° to 60° . The granite rock entirely disappearing, the country became quite level, and covered with one universal thicket of aracia and eypress, except the very slight depression which formed a shallow valley about three miles wide, through which the river runs in a deep channel from 80 to 100 yards wide in ordinary seasons, but when in flood must exceed 500 yards, and the rise of the water, judging from the rubbish drifted up in former years, must exceed 30 feet. The valleys did not seem to be more than 100 feet below the general surface of the country (which was quite level), filled with a dense thicket of wattles; a narrow strip of large gum-trees, growing in grassy flats close to the river, marked the course of the stream. At 5h. we halted for the night by a small pool of fresh water in one of the back channels of the river, the pools in the main bed being all brackish.

19th. Started at 6h. 35m., following the river, the general course being N.N.E.; no change was observed in its character. At 1h. 20m. halted to rest the horses, and again started at 1h. 40m. At 3h. 40m. came on a large party of natives at a fresh-water pool; five followed us some miles, and were not to be satisfied until we had made an exchange of part of a handkerchief for a quantity of "noollan," some downks, and tabbas, some of which we accepted as a token of our friendly intentions. The stream-bed turned E., and we followed it until 6h., when we halted for the night, having the good fortune to find a little fresh water by digging in the mud in the bed of the river, the pools being all brackish.

13th. At 4h. 15m. we were again in our saddles, and continued our journey up the river—the general course N.N.E. In vain we looked for some rising ground or hill from which we might obtain a view of the country, but the same sandy level, covered with dense thickets of wattles, still met the eye till 11h., when we observed a low sandstone cliff forming the eastern side of the valley. In this direction we steered, and after pushing through thickets of wattle growing on stony ground, with small patches of salsolaceous plants, we arrived at the foot of the cliff, which was about 60 feet in height, of white sandstone, full of rounded quartz pebbles. The top was nearly on a level with the general plane of the country, which was of a most cheerless aspect. The valley of the river trended to the N.N.E. for 8 or 10 miles, then to the E.; the width appeared about 5 miles, and one dense thicket of wattles seemed to fill the entire space. The rest of the country was, without the slightest exception, level in the extreme, covered with one universal thicket of aracia and eypress, the latter indicating the sandy nature of the soil. As no appearance of change in the character of the country within 20 or 30 miles was visible, and we had only two days' provision left (not having expected the stream to extend so far), and the camp at 60 miles distant, we were obliged to leave the farther examination of the river to some future explorers; but we regretted it the less as, from the nature of the gravel and sand brought down by the stream, there seemed great probability that it takes its rise in large salt marshes similar to those known to exist 100 miles E. of the Irwin, if it does not actually drain them, as the general trend of the most northerly marshes seen was

* E.N.E. ?—Ed.

in the direction of the upper part of the Murchison. Under these circumstances, we returned to our bivouac of last night, reaching it at 5h. 40m.

14th. Started at 6h. 25m., and retracing our route down the river, came to our bivouac of the 11th at 5h. 5m., without any incident worthy of notice, but surprising three or four natives asleep in the bed of the stream; they were of the party seen on our route up the river.

15th. *Sunday*. Resumed our journey: passed two parties of natives—a few of them followed us some distance, and having overcome their first surprise, commenced talking in their own language, which, as far as we could understand it, had great affinity to that spoken by the natives in the York and Toodyay districts. After a smart ride of seven hours we arrived at the encampment, found the rest of the party all well, and the horses much improved by their few days' rest.

16th. The two horses we had ridden up the river requiring a day's rest, which was also acceptable to Mr. Barges and myself, we remained at the camp and made preparations to move on to the Hutt River the next day. Mr. Walcott brought in some specimens of galeas, which, on farther observation, proved to be abundant.

17th. Leaving our encampment at 9h. 10m., we steered a southerly course, passing over a succession of low granite hills, thickly covered with pennis, to the exclusion of almost every other kind of vegetation, save a few scattered tufts of grass. At noon entered the sand-plains which occupy the high lands in this district; observed a patch of grassy land bearing S.W.; proceeding in that direction, at 1h. came on it, but found it to be a very small spot of grassy granite country, encircled by sand-plains and scrub. Continuing our course, at 2h. 5m. struck a small stream-bed trending W.S.W.; the valley in which it runs is bounded on both sides by sandy hills, covered with scrub; some patches of grass and wattles occupied the lower ground wherever the granite rock showed itself; tracing the stream-bed downwards, we found many brackish pools. At 3h. 45m. crossed the left bank—found it running, but brackish; and at 4h. 20m. we bivouacked at its junction with the Hutt River, which was here about 10 yards wide, with narrow grassy flats on both banks. The hills are of sandstone and sand, producing little besides scrub.

18th. Started at 7h. 50m., steering N. 140° E. mag. up the valley of the Hutt, which gradually widened and improved, the hills being grassy for an average distance of two miles back from the stream, of granite formation, and thinly sprinkled with wattles; behind the grassy land the country rose into sandy plains, covered with short scrub. At 9h. 20m. crossed to the left bank; the river trended to the eastward. At 11h. 10m. sighted King's Table Hill, bearing S. mag. We then descended into the rich and grassy valley of the Bowes River; this we traversed till 4h., when we bivouacked in a small stream tributary to the Bowes. As the country passed over this day had not been previously examined, we were much pleased to find it equal to the best land on the southern branch of the Bowes, visited by the Surveyor-General and myself on former occasions.

19th. Messrs. Barges, Bidart, and myself, rode down the Bowes to examine the country, and found it generally of good grassy character, suitable for sheep; the bed of the streams being filled with broad-leaved reeds, seems to indicate an abundant supply of water in the dry season, but the pools were very small, and the water all brackish, not even excepting the running streams. The hills are of gneiss, with garnets and trap-rock, the latter producing excellent grass of various kinds, the most conspicuous of which is a species of kangaroo-grass, but of a less woody character of seed-stalk than that found in other parts of the colony. The extent of land fit for sheep-feeding on this stream (it can scarcely be called a river), I should estimate at 100,000 acres, and Mr. Barges considered it capable of feeding about 17,000 sheep. The existence of garnets, iron pyrites, and a mineral resembling in many of its properties plumbago, specimens of which were found in the gneiss of this district, seems to indicate a metalliferous formation, and I have little doubt a further search might develop many at present hidden sources of wealth. Near the coast we fell in with some natives (four men and five women), who were very friendly, but from their peculiar nature we were unable to accept of their civilities.

20th. Started with Messrs. Barges and Walcott to examine the upper part of the Buller River; after passing over the country examined by Lieut. Irby and

myself in December, 1846, we crossed the granite ridge which divides the valley of the Buller into two nearly equal portions. We found the land on the left bank of the eastern branch of very good and grassy description, consisting of a range of granite hills about 10 miles N. and S., and 2 miles in width; to the E. of which the high sandy and level plains commence in an abrupt line of sandstone slopes and hills. Halted for the night in the E. branch of the Buller, with water in small pools and abundance of grass for our horses.

21st. Continued the examination of the Buller valley down to the spot where I bivouacked on the river in December, 1846; then followed up the stream for 7 miles, where we dined, and then steering W.N.W., arrived at the camp at 6h. 30m. We estimated the valley of the Buller to contain about 10,000 acres of good grassy land, and 30,000 acres of inferior feeding country; the good land is much broken into patches by that which is of indifferent quality. Timber is here, and also on the Bowes, very scarce, and the little that exists is very indifferent and small.

22nd. *Sunday.* Messrs. Bidart and C. F. Gregory walked to the hill which lies $\frac{1}{2}$ of a mile W. of King's Table Hill. The rock of which it is formed appeared to belong to the coal formation, as thin seams of black shale were seen in the rocks of which the lower strata of the hill are composed; but the natives making their appearance, it was not considered prudent to remain geologizing among the cliffs. Returning towards the camp, the natives followed for some distance, and on descending a cliff the women commenced pelting the party with stones, apparently in revenge for the refusal of certain courteous invitations, which perhaps are the greatest marks of politeness which they think it possible to offer to strangers.

23rd. Left our encampment at 8h. 5m., and steered 150° mag. over granite hills producing wattles and good grass. At 9h. 40m. crossed the S. branch of the Bowes, after which the country was not so well grassed, except in the valleys. The lower hills were of granite; the higher, red sandstone of tabular form. At 11h. the country became more sandy and covered with short scrub, gradually rising to the S. At noon we obtained the high table-land; crossed two scrubby valleys bounded by sandstone hills, in the first of which the black shale peculiar to the coal formation showed itself, with a slight dip to the S. At 1h. 50m. crossed the Buller in a rocky channel with reedy pools, apparently of permanent character. The land improved and became grassy, and ascending the hills on the left bank, passed Peak Hill at 2h. 50m.; this is the highest part of the range between the Buller and Chapman. From this we steered S., down a small grassy valley; the hills with granite bases and sandstone table summits, with excellent grass, and thinly wooded with acacia and a few York gums. At 3h. 15m. bivouacked in a patch of excellent grass with water in small quantities.

24th. A violent thunder-storm during the night was followed by a rainy and misty morning; the weather clearing up, we walked down to the Chapman River, which was running in a sandy channel with small shallow pools. The land on the bank of the stream was very indifferent and sandy for about a mile, when it rose into granite and sandstone hills, covered with excellent grass.

25th. Accompanied by Messrs. Burges and Walcott, I proceeded to examine the country to the eastward of our camp. Starting at 7h. 20m., steered E. over grassy hills, with granite bases and table summits of red sandstone, the latter rock forming but a poor soil, with scanty feed and scrub; crossed several small gullies running into the Chapman. At 10h. passed a large sandy hill, covered with short scrub, and halted at 11h. in a grassy gully in the bottom of a wide scrubby valley. At 4pm. p.m. again resumed our journey, and ascending the sandy downs, at 1h. 15m. gained the highest ridge. Before us lay the valley of the Greenough River. The white and red sandstone cliffs, which bound the valley on the S.E., were distorted by excessive refractions, which, as we crossed each sandy ridge, changed their appearance, sometimes assuming the appearance of islands with high rocky shores, then like reefs with heavy breakers, followed by high cliffs and grassy hills; but as we approached, they assumed their true character of low rocky hills and cliffs, scarce exceeding 200 feet in height, and generally covered with dense thickets of acacia, growing on an otherwise barren stony soil. At 5h. 30m. came on the right bank of the Greenough River; the bed was quite dry, and had no appearance of having run since the winter of 1847. Following up

the stream-bed to the N.E., passed some shallow pools of salt water; and at 4h. 45m. observed the black coal shales at the bottom of a deep cliff, which formed the left bank of the river. At 5h. halted for the night, obtaining fresh water by scraping in the sand by the side of a pool of salt water; we also found sufficient grass for our horses on the bank of the river.

26th. At 7h. 10m. left our bivouac, steering N. 120° E. mag. towards a high sandstone cliff, which, after a ride of $\frac{3}{4}$ of an hour through thickets of acacia, we ascended; but the view was not satisfactory, as thickets and scrubs extended over the whole of the country. We, therefore, returned to the river, and followed it downwards to the S.W. by S. At 11h. 30m. found some fresh water in a small water-hole in the bed of the river; halted till 1h. 50m. to refresh the horses. The river turned S., and at 2h. 27m. was joined by a small gully from the W., and coming from a grassy valley. As it had run during the last winter, it quite altered the character of the river for $\frac{1}{2}$ of a mile, filling the pools with water, and giving the grass and trees a freshness, which formed a most striking contrast with the brown and parched appearance of the rest of the valley. At 3h. 55m. altered the course to 210° mag.; the country improved, many patches of grassy land appearing in the valley, and the country became more rocky. At 5h. 30m. crossed to the left bank, and found the river running with many large pools of water, some more than $\frac{1}{4}$ a mile long and 80 to 100 yards wide. The water was slightly brackish, being this year supplied principally by springs, taking their rise in the new red sandstone formation. We then followed the winding course of the river S.W. amongst high hills of sandstone, many of which were covered with excellent grass, though the country was not generally good. At 6h. 20m. halted for the night on the right bank of the stream, in a narrow but rich grassy flat; heavy rain in the night.

27th. Started at 7h., and steering an average course of W. by N., ascended the high land on the N. bank of the Greenough. For the first hour the hills were of red sandstone, very steep and rocky, producing little but coarse scrub; some of the valleys and lower hills were well grassed; the country then improved, the hills being of the coal formation, and the limestones forming very rich and grassy hills. At 9h. 40m. the granite and gneiss formed the bases of the high sandstone-topped hills, which rose about 500 feet on each side of the valley. At 10h. 15m. crossed to the left bank of the river, and re-crossed to the right at 11h. 10m. The lower parts of the valley were not so rich or well grassed as the hills, but would afford excellent summer feed for sheep. Having dined, and given our horses an hour's feed on the rich grass which grew in the bed of the river (which here turned to the S.), we continued our route. After an hour's ride over rich grassy hills, reached the foot of Wizard's Peak. Here we left our horses and ascended the hill; arrived at the summit, to our great surprise, instead of the scrubby and sterile country described by Captain Stokes of the 'Beagle,' beautiful grassy hills, stretching from N. to S.E. met our view to the extent of about 20,000 acres; had it not been certain, from bearings to Mount Fairfax and other hills, that we were on Wizard Peak, I should have suspected its identity. Leaving Wizard Peak at 2h. 30m. steered N. along the western foot of the grassy range. The country to the E. consists of grassy hills of limestone, rich in fossil remains of wood and shells, with an occasional granite hill producing coarse grass or short scrub; to the W. the country was more level, but less grassy, and in many parts scrubby. We fell in with some of the natives, who appeared friendly disposed. Crossed the Chapman at 6h. 5m., and arrived at the camp at 7h. 15m.

28th. Left the camp at 7h. 40m., steering N.W. Made the stream previously called the Buller at 9h.; followed it downwards to the S.S.W. till 11h., when it became evident that, instead of being the Buller, it was the N. branch of the Chapman. The land on its banks was not generally good, although some fine patches of grass were seen. Leaving the stream, we ascended Moraby's Range; the valleys and sides of the hills were covered with fine grass, and the sandstone rocks were rich with fossil remains of shells and wood. With some difficulty we discovered the western face of the hills; after which, an hour's ride over a scrubby plain brought us to the mouth of the Chapman River, running strongly over a ledge of limestone rock into the sea. We crossed the river, and rode over to the usual landing-place in Champion Bay; we then returned to the Chapman, and halted for the night.

29th. Two of the horses having broken from their tether during the night, we were obliged to put the three saddles on the remaining horse, and proceed to track the stray horses; after tracking them about 2 miles, we found them on their way back to the camp. We then rode along the western foot of Moresby's Range, and ascended Mount Fairfax; after taking sketches and bearings, we steered for the encampment, and reached it about 2h.

30th. Messrs. Burgess, Walcott, and Hildart, rode out this morning to examine the grassy hills on the S. side of the Chapman River, and on their return reported the country to be of a generally good grassy character.

31st. Left the encampment at 8h., and steering 200° mag. over alternately grassy and scrubby hills of granite sandstone, crossed the Chapman at 9h. 40m. Our course then lay nearly parallel to the river till noon; the land on the river was indifferent and thinly grassed, but rose into good grassy hills about a mile from the river. We then entered a level scrubby plain, extending from the Victoria Range to the sea. At 12h. 30m. altered the course to 175° mag., and at 1h. 5m. to 139° mag. At 1h. 15m. the plain became grassy, and the soil good (with the exception of a few patches of York gum, the only trees were wattles), and by a rough estimate contained about 8000 acres of good grassy land. On the N. bank of the Greenough River, which we reached at 3h. 15m., the channel was about 70 yards wide, but dry and sandy; nor did we observe any sign of its having run during the past winter. A little below where we struck the river, it turned to the S.E.; following it in that direction till 3h. 45m. we bivouacked, obtaining a scanty supply of water by digging in the sand. Shortly after halting, a party of about 30 natives came up, and appeared friendly; they told us that there was a fine spring at some distance to the westward, but we could not obtain any other useful information, as their dialect differs considerably from that spoken in the settled districts, although some few words are the same. They encamped a short distance from us, and in the night stole our frying-pan to dig a well, but returned it next morning before the theft was discovered.

Nov. 1st. At 7h. 10m. resumed our course S.E., along the eastern side of the grassy plain. The scrubby hills gradually approached on each side, and at 9h. 50m. the good land terminated, the estimate being 2000 acres on the S. bank of the Greenough River. The country then became sandy, producing little besides scrub and a few banksia trees. At 10h. passed about 1 mile W. of Mount Hill; passed a small pool of water in a watercourse trending S.W. At 50m. p.m. altered the course to 170° mag.; at 9h. entered a thick forest of York gum; at 3h. 25m. changed the course to 150° mag., and entered a grassy flat extending to the Irwin River, which we reached at 3h. 55m., and following it upwards till 4h. 15m., bivouacked on the left bank in a large flat. Shortly before reaching the river a large party of natives came up with us, after tracking the horses for some distance. 70 or 80 men came to the bivouac, and, with the exception of one man who shipped a spear, making a demonstration of throwing it at us, they evinced a desire for the more peaceable amusement of eating damper and fat bacon. A few of the natives spoke a little English, having been for a short time in the settled districts. At sunset they retired to the other side of the river, and all appeared quiet, when my watch commenced at half-past 10 p.m.; but at midnight I detected a native crawling up amongst the thick grass about 10 yards from the back of the tents. He lay quiet till I almost turned him out of his hiding place with the muzzle of my gun, when he took to his heels, but I did not consider it prudent either to fire at or capture him.

2nd. The natives being too numerous to allow any of the party leaving the camp to examine the country around without incurring greater risk than seemed prudent, we left our bivouac at 7h. 45m. and steered N. 170° E. mag. over sandy hills, covered with short scrub. After 2 hours the country became nearly level, with small patches of swampy ground, which would be very wet in the rainy season, but was at present quite dry; the rising grounds were sand, covered with short scrub, with a few scattered banksia trees. At 5h. 40m. struck the left bank of the stream which has been considered to be the Arrowsmith River of Captain Grey, though I have now some reason to doubt its identity. The banks of the stream are sandstone and sand, and the channel scarcely 3 yards wide, with a strip of grassy thicket 20 yards in width along the stream, which is the only feed near the river, as the plain through which it runs produces nothing but scrub and banksia,

with a few grass trees. We bivouacked a short distance below the spot where we first struck the stream, which was still running.

3rd. Our horses having but a very scanty feed at this place, we moved down the stream to obtain better grass for them before crossing the sand-plains which lay to the S. After following the stream W. for 2 hours, encamped in a small grassy flat, below which the stream ceased to run, the water being wholly absorbed by the sandy soil, which has a substratum of limestone of recent formation.

4th. Accompanied by Mr. Bidart, rode to the westward; passing over sandy plains and ridges for 4 hours, came to the beach, which we followed northwards for 3 hours, hoping to meet with the mouth of the stream on which our camp was placed. Not perceiving any signs of it we turned to the E., and after an hour's struggle through a thick jungle, we came on a wet grassy flat, on which the stream seemed to be lost. Steering a general course of S.S.E., we arrived at 9h. 10m. at the camp, after a ride of 13½ hours, and the country traversed almost wholly worthless sand and scrub.

5th. *Sunday*. Remained at our encampment to rest the horses. Read prayers.

6th. Leaving our encampment at 7h. 10m., we steered N. 170° E. mag. along the eastern limits of the low scrubby limestone hills, which extend along this part of the coast. To the E. the level sandy plain extended from 8 to 10 miles, and then rose into high sandstone hills, covered with scrub and destitute of trees; but at the junction of the limestone and sandstone formation, along which lay our route, were several small lagoons and swamps of fresh water, with grassy margins. At 10h. altered the course to southward; the line of swamps trending to S.S.W., we entered the level sandy plain. At noon passed a shallow pool of rain water in a slight depression of the plain, and shortly after crossed two small watercourses trending W.; a little brackish water remained in the deeper portions of their channels. The effect of refraction on this level country, when heated by the midday sun, was so great as to raise many of the low sandy ridges to appear like large lakes and inlets of the sea, as in some instances the more distant hills were obscured by its effects. At 2h. 45m. we reached the sandstone range, and at 3h. 5m. halted in a small patch of grass around a native well of good water, which had the appearance of retaining water throughout the summer.

7th. At 7h. 20m. resumed our journey southwards, over high and sometimes rugged ranges of sandstone hills; passed a short distance to the E. of Mount Peron and Leueurt. The valleys were wooded with red and white gum of large growth, but the hills produced little besides coarse scrub. At 2h. 20m. passed a large mound-spring, and at 2h. 45m. crossed the Hill River of Captain Grey; the land on its banks, with the exception of a few grassy hills on the northern side, was very scrubby and indifferent. Ascending the high sandstone country on the S. side of the river, we halted at 5h. 35m. in a sandy valley trending N.W., in which we found a small patch of grass around a native well; but we were not much in want of water, being completely drenched by a heavy shower of rain just after we halted.

8th. Resumed our journey at 5h., steering N. 150° E. mag. over a range of high scrubby sandstone hills. At 1h. 15m. crossed a small stream-bed, trending westwards in a wide scrubby valley. At 3h. 5m., having ascended the hills to the S. of the valley, observed a remarkable sandstone hill which I had passed on a previous excursion from Mr. Lefroy's station at Welbing. Altering the course to 170° mag., we passed the hill; at 5h. 45m. halted in a fine grassy flat on the banks of a small brook-course trending W., in which we found abundance of water in small pools. As we were only 40 miles W. of Mr. Lefroy's station at Welbing, and the country in that direction already examined, I instructed Mr. C. F. Gregory to proceed with the party and the packhorses to Welbing, and thence by the road to Perth, while, accompanied by Mr. Bidart, I pursued a more direct but less eligible course for packhorses.

9th. Leaving the rest of the party at the bivouac at 9h. 50m., in company with Mr. Bidart we steered a general course of S. by E. mag. over hills of sandy loam, producing a little grass and thickly timbered with red gum. Passed several extensive grassy valleys, with many fine patches of rich limestone land on their slopes. At 2h. the grass was replaced by scrub, and at 3h. 30m. entered the wide scrubby valley of the Moore River, which we reached at 4h. 20m. After some delay in crossing the river, in consequence of one of the horses falling down in

the mud, from which we had some trouble to extricate him, we bivouacked about 1 mile below the spot where we first made the river.

10th. Leaving the Moore River we steered S. by W., and after traversing a nearly level sandy plain, producing banksia and scrub, with many lagoons and swamps, in 8 hours' riding reached the Norcott or Gugin Brook. The banks were low and swampy; after a short search found a suitable place for crossing, and having swum the horses across, we halted for the night on the left bank.

11th. Started at 7h., steering E. by S. mag.; ascended the western Wilbinga Hill at 9h., and traversing a rough limestone country, with several reedy swamps, reached Lake Newergup at 2h. 50m., and at 4h. halted on the western side of the Waaginup Swamp.

12th. *Sunday.* Once more in the saddle, and following the road past Wonneroo, arrived in Perth at 2h. 30m.

Mr. C. F. Gregory having accompanied the party to the Victoria Plains, proceeded with Private W. King by the Bindoon road to Perth, where he arrived on the 17th.

The total distance travelled in this expedition was, in round numbers, 1500 miles, and the extreme point reached, in latitude 27° S., 350 miles from Perth in a direct line; and the period we were engaged in the expedition was 10 weeks.

III.—His Excellency Charles Fitz-Gerald's Expedition to the Murchison River.

December 1st. Sailed from Freemantle in the 'Champion' for Champion Bay, where we arrived on the 3rd, swum the ponies on shore, and encamped at the mouth of the Chapman river.

4th. His Excellency the Governor came on shore, when the party, consisting of the Governor, Mr. Bland, and myself, with three soldiers of the 96th regiment, and the Governor's servant, started at 7h. 15m., steering N.E., crossed Mureshy's flat-topped range at 9h., made the N. Chapman at 10h., followed the stream upward till 11h. 50m., the general course N.E. by N. One native man and two women came up, and then retired to the other side of the river, watching our proceedings. Having dined, we started again at 2h. 25m., steering a general N. course over an indifferent scrubby country till 4h. 40m., when we halted for 20 minutes to examine the black shale-like soil which was seen on a former occasion, but on digging it proved to be only alluvial soil resting on sand; from this spot we steered N. 330° mag. over high sandy hills covered with scrub, the country gradually improved, and at 7h. we halted for the night, in a small grassy gully trending N.W., obtaining water in a native well.

5th. Started at 6h. 40m., continuing the same course as yesterday evening over a succession of grassy hills of granitic formation till 11h. 10m., when we halted on the eastern branch of the Howes river; several natives shortly came to the encampment, and having eaten some biscuit and pork which we offered to them, retired in the evening to the opposite side of the stream-bed, keeping a close watch on us from behind some large rocks: a strict watch was therefore maintained by us during the night.

6th. This morning the natives commenced by throwing stones at the men who went down for the water, but we did not see any other method of resenting it, except by expressing our disapprobation in words, and at 5h. 35m. we started on a N.N.W. course, the natives followed for about a mile, and continued throwing stones at the party. The country passed over was generally grassy granite hills till 9h., when we ascended the high table land between the valley of the Howes and Hutt rivers, which last we reached at 10h. 25m., and halted during the heat of the day on a pool of brackish water; at 3h. 20m. again started, and following the river downwards, in a general course of 310° mag. at 6h. 10m. bivouacked at the spot where we had before halted on the 17th of October, the water in the

pools brackish, but by digging near a moist bank obtained abundance of fresh water.

7th. Left our bivouac at 5h. 30m., and steered N.E. over high sandy downs, covered with coarse scrub; at 10h. 30m. entered the valley of the Murchison river, at noon halted at our bivouac of the 24th of September, obtained some brackish water by digging in the sand of the small stream-bed; having dined, we resumed our journey at 2h. 30m., and bivouacked about 5h. on the left bank of the Murchison, 500 yards below the large lead vein, obtaining good water in the sandy bed of the river by digging a few inches, the pools being all salt. While the men were preparing the tents, &c., the Governor proceeded to examine the vein of lead, which we traced to a greater distance than on the former occasion of its discovery, the water having sunk two feet, exposing many portions of the vein which were before covered.

8th. Examined the lead vein, tracing it 320 yards in a direction N. 30° E. mag. along the bed of the Murchison river, which was nearly dry; clearing the sand and loose stones from the surface, found it to vary from 8 to 24 inches in width, the general average being 12 inches, the dip to the W.N.W. at an angle of about 80° from the horizon. Throughout the whole length, the lead vein appeared to be one solid mass of galena; the northern end either terminates or alters its direction close to a vein of schistose rock, which intersects the adjacent rocks; to the S. the lode was covered by several feet of sand, which prevented its being traced further, as we had not time to remove it; the whole of the vein which was traced was included within the banks of the river, and the greater portion covered by shallow water. One specimen of galena showed traces of copper. The rock which prevails on each side of the vein is a hard compact gneiss, abounding with garnets, some of which are of good colour, but mostly full of flaws; the stratification of the gneiss is somewhat confused, but it generally dips at a high angle (sometimes nearly perpendicular) to the westward, the strike being N. and S. The facilities which the position of the lode offers for mining are not very great, as it occupies the lowest part of the valley, and steam power would be requisite to free the mine from water, and at the same time, unless the small boat-harbour near the mouth of the Hutt river, or Gantseume Bay (both within 30 miles), be found suitable for the purpose, Champion Bay, distant 62 miles in a direct line to the S., is the nearest port where the ore could be shipped. In the evening the Governor examined the spot where Mr. Walcott had discovered the small pieces of lead ore about 2½ miles below the lode, but as most of the pieces had been picked up on that occasion, we could only find a few fragments of it.

9th. Left the encampment at 4h. 40m., and steering about S.W., made our former bivouac on the Hutt river about 1h. p.m., and halted for the rest of the day.

10th. Started at 4h. 50m., steering 160° mag. over sandy country, passed a small grassy valley at 5h., halted on the N. branch of the Bowes at 10h. 10m. on a small pool of brackish water, dined, and resumed our route at 2h. 40m., steered S. over a grassy country till 6h. 10m., when we halted for the night on a tributary stream to the Bowes, obtained fresh water by digging, the pools being very small and brackish.

11th. Left the bivouac at 5h. 15m., steering 175° mag. over an indifferent country till 6h. 40m., when we crossed the S. branch of the Bowes, the country improving. Here we saw several natives, who at first hid themselves, but finding that we saw them, came after us. At first they did not exceed 9 or 10 in number, but, being joined by several other parties, gradually increased till they exceeded 50, when they altogether changed their friendly manner, and began to bring up their spears. At 6h. 15m. we passed to the W. of King's Table-hill, and as the country was covered with dense wattle thickets, the natives took advantage of the ground, and having completely surrounded the party, commenced first to threaten to throw their spears, then to throw stones, and finally one man caught hold of Mr. Hauld by the arm, threatening to strike him with a dowak; another native threw a spear at myself, though without effect, but before I could fire at him, the Governor, perceiving that unless some severe example was made the whole party would be cut off, fired at one of the most forward of our assailants, and killed him; two other shots were fired by the soldiers, but the thickness of the bushes prevented our seeing with what effect. A shower of spears, stones, kyllies, and dowaks followed, and although we moved to a more open spot, the natives were

only kept off by firing at any that exposed themselves. At this moment a spear struck the Governor in the leg, just above the knee, with such force as to cause it to protrude two feet on the other side, which was so far fortunate, as it enabled me to break off the barb, and withdraw the shaft; the Governor, notwithstanding his wound, continued to direct the party, and although the natives made many attempts to approach close enough to reach us with their spears, we were enabled, by keeping on the most open ground, and checking them by an occasional shot, to avoid their attacks in crossing the gullies: they followed us closely for 7 miles, after which they were only seen occasionally, following in our track. Having reached the beach, we were enabled to travel more rapidly, and though one of the ponies knocked up, we reached Champion Bay at 3h. 30m., and got the party and horses on board the 'Champion' by 5h. p.m., where we were gladly welcomed by Lieut. Helpman. About sunset the natives came down to the beach, concealing themselves behind the bushes, whilst a single unarmed native stood on the beach, and called to us to come on shore, no doubt in the hope of making a sudden attack on the boat should we venture to do so.

A. C. GREGORY, Assist-Surveyor.

Extract from the Narrative of a Journey from York to Champion Bay, in the colony of Western Australia, during the months of May and June, 1851, by Mrs. Brown, of Grass Dale.—"Mr. James, the mining captain engaged in superintending the works at the Geraldine Mine on the Murchison, spoke of having lately discovered a vein of copper ore, and describes the country about the Murchison and the Bowes as being very rich in minerals. A peep at Mr. Burges's mine was reserved for next day; accordingly after breakfast we set forth, but without our host, of whom we took farewell. Mr. Gregory guided us to it, and pointed out mineral indications as we were nearing the spot. With a pickaxe some rather round, rugged, and very heavy stones were loosened from the ground, in which great numbers of the same kind are embodied. These contain the lead, being only crusted with stone; some more valuable mineral may perhaps be found as they are collecting the lead, for slight indications of copper are apparent at the same place."—*Ed.*

IV.—*Journey from Great Bear Lake to Wollaston Land.* By Dr. JOHN RAE.

Communicated by the Hudson's Bay Company.

Read Nov. 10, 1851.

To Sir George Simpson, Governor-in-Chief, Hudson's Bay Company's Territories.

Provision Station, Kendall River, 10th June, 1851.

SIR,—I have the honour to acquaint you that I arrived at this place to-day, from the Arctic coast, with my two men, having been absent 42 days, during which the shore of Wollaston Land was examined to the eastward of long. 110°, and westward as far as long. 117° 17', without finding any strait or passage leading to the N., and without seeing any traces of Sir John Franklin's party, or obtaining any tidings of them from the Esquimaux we met with.

I left Fort Confidence on the 25th April, accompanied by four men, with three sledges drawn by dogs, and a small sledge drawn by the men alternately, on which our provisions and baggage were

stowed. We reached this station on the 27th, and were detained two days by stormy weather. This time was profitably employed in arranging our baggage and stores, repairing and strengthening our sledges, and in recruiting the dogs.

On the 30th, everything being in readiness, and the weather fine, I started for the coast, with two men (Beads and Linklater), and two sledges drawn by five dogs. A fatigue party of three men and two dogs accompanied us to within half a day's march of the coast. In consequence of a great thaw that had occurred the previous week, which cleared much of the ground of snow, the travelling was exceedingly bad; and although long détours were made to find a good road for the sledges, they got much injured by the stones.

On the 1st May we put *en cache* for our return journey a little pemmican and flour; and next day, when 10 miles from the coast, the fatigue party was sent back. After experiencing much difficulty in crossing some deep ravines, we reached the shore of Richardson Bay, about 5 miles W. of the mouth of the Coppermine, near midday, when I was most happy to find that, as far as visible, the ice to seaward was not unfavourable for travelling.

Being desirous of walking during the night, to prevent the glare of the sun on the snow inflaming the eyes, we commenced our journey at 10 P.M. on the 2nd. The weather was unpleasant, with a strong breeze of cold N. wind, as we directed our course as straight as possible for Point Lockyer. The ice being smooth, and the snow hard, we advanced rapidly until 8 A.M. on the 3rd, when we stopped for the day in lat. (by observation) $68^{\circ} 8' 44''$ N. The building of an excellent snow-house occupied us $1\frac{1}{2}$ hour, during which our simple cooking was going on, so that no time might be lost.

On the 4th we encamped on the beach 5 miles N. of Point Lockyer, where we found some wood for cooking, and, as the weather was fine, no snow-hut was required; the wind was, however, still sharp, and a temperature of 10 made a shelter in the form of a semicircular wall of snow agreeable.

At 9h. 15m. P.M., we were again on foot, our course being directed towards the N.W. end of Douglas Island, on which we landed at 5h. 5m. A.M. on the 5th, when we cooked a kettle of pemmican and flour with some wood picked up, and put "*en cache*" a quantity of provisions for our return.

After two hours' stay we resumed our march in a nearly N.E. direction.

At the same hour as on the previous evening, we commenced our night's march, and a walk of $1\frac{1}{2}$ mile brought us to a low point covered with debris of sandstone and limestone and a few

boulders of granite. The land was so low that from our snow-house it appeared much more distant. We now turned eastward, but had much difficulty in keeping alongshore, as there were several small bays and islets, among which, in the hazy weather, we had some trouble to find our way. Under these circumstances, rather than lose time uselessly, I determined to travel overland due E., leaving the coast to be traced when returning, at which time the thawing of the snow would have laid bare a greater extent of the shore, and made it more easy to define.

On our second day's march over an uninteresting tract of low ground, swamps, and lakes, we arrived at the coast at 6 A.M. on the 7th, nearly opposite to some large rocky islands, and at a place where the shore presented a high sloping front. After a two hours' walk to the E. by N. alongshore, we built our snow-hut in lat. $68^{\circ} 31' 42''$ N., and long. $111^{\circ} 30'$ W., under a steep bank, surmounted by some whitish limestone and reddish brown sandstone *in situ*. Here, during the interval between taking the observations for time and latitude, I shot 10 hares. These fine animals were very large and tame, and several more might have been killed, as well as many partridges, had I thought it expedient to follow them.

7th and 8th May.—Our course for the first 5 miles of this night's march was nearly E.S.E., until we rounded a long point, and crossed a deep bay in an E. direction, some large islands lying outside, at a couple of miles distance from shore, but gradually approaching it to within half a mile as we advanced eastward. These islands I named after the distinguished naturalist and traveller, Sir John Richardson. The islands, as well as the adjacent coast, were high, rocky, and in many places precipitous. Specimens of the rocks have been preserved.

The land now turned imperceptibly northward to N. 40° E., in which direction we proceeded 4 miles, to the entrance of a narrow inlet, on the W. side of which, in lat. $68^{\circ} 38' 5''$, long. $110^{\circ} 50'$, we stopped at 8h. 30m. A.M., but built no snow-hut, as the weather was not bad.

Previous to taking the noon observation, and whilst supper was cooking, I examined the inlet, hoping to find it a passage leading to the northward, but a walk of $2\frac{1}{4}$ miles undeceived me. Several deer were seen, but, as we had abundance of provisions, no attempt was made to approach them.

On the night of the 8th the weather was so stormy, with thick snow, that we could not travel; we therefore built a snow-house, and made ourselves comfortable, occupying our time repairing shoes, making up calculations, &c.

Next night, the weather having become better, we resumed our march, and travelled nearly 3 miles rather to the southward

of E., then E. $1\frac{1}{2}$ mile; after which we crossed a point 2 miles broad in the same direction. We now traversed a considerable bay, with low shores, our course being E. by N. To this bay I gave the name of Welbank, after one of the directors of the Hudson's Bay Company.

As we travelled onward the land continued low, and had an easterly trending during the remainder of our night's walk, which was not continued so long as usual, the weather being extremely cold for the season. The thermometer showed a temperature of 22° below zero, which made the shelter of our snow-hut more than usually acceptable. One of the men got rather deeply frost-bitten in the face, and the taking of a set of lunar distances was rather unpleasant work. I have generally found, indeed, that a temperature which in winter would be pleasant, is, in the latter part of spring, almost insupportably cold. The latitude of our position was $68^{\circ} 37' 48''$ N. by observation; longitude, by account, $110^{\circ} 2'$.

The farthest point of land, about 6 miles distant, bore E.S.E., so that it appeared unnecessary to travel farther in this direction, as my survey and that of Messrs. Dease and Simpson must have met here, although our latitudes do not agree, mine being some distance S. of theirs.

There were now two modes of proceeding open to me,—the one being to strike overland to the N. in search of the sea-coast; the other to return along the coast and travel westward, in hopes that some of the spaces of Wollaston Land left blank in the charts might prove to be the desired strait. I chose the latter of these modes, because to travel overland in a northerly direction would be very difficult and fatiguing, and would always be getting more so, as the ridges of land (most of which were already clear of snow) lay across our line of route, so that a few days of warm weather would have made travelling with sledges and dogs very difficult, if not wholly impracticable.

The night of the 10th was very stormy, with thick snow-drift, but, the wind being in our backs, we commenced our return to our previous day's resting-place. After walking some time we fell upon our old track, which saved me much trouble in taking bearings, as they would have been often requisite, the snow falling so thick that we could not see to the distance of 20 yards. After a very cold but smart walk of rather more than 7 hours' duration, we were glad to find ourselves snug under cover of our old quarters, our clothes being penetrated in every direction with the finely-powdered snow.

The weather, on the night of the 11th, continued so bad that we were obliged to remain *indoors*, but the following night was fine enough to allow us to proceed westward by our former track.

Our journey to Douglas Island was favourable. The coast, from lat. $68^{\circ} 31' 40''$ N., and long. $111^{\circ} 30'$ W., up to Cape Lady Franklin, in lat. $68^{\circ} 29'$, and long. $113^{\circ} 5'$, was, with the exception of one high rocky point, low, and indented with many bays of small extent, the general direction being nearly W. The weather continued good, so that we arrived at the N.W. extremity of Douglas Island at a few minutes to 8 A.M. on the 15th, when we found abundance of drift-wood to cook with.

As to return by Douglas Island would lead us out of the straight road homewards, when we started on the 16th for Wollaston Land we carried with us the provisions we had previously put *en cache*. We directed our course to the most distant visible point, bearing about N.N.W., and found that it was 9 miles distant; but in reaching it we were much delayed by rough ice, in rounding which we increased the length of our walk very much, and a very heavy fall of snow stopped our farther advance.

Our next night's journey was rather long, to make up for the time lost by the bad weather. For 13 miles our course was about N.N.W., along a series of bays and points; the coast then ran N. for some distance, and afterwards slightly to the eastward, until we encamped on a small peninsula near the head of a bay, in lat. $69^{\circ} 1'$, long. $113^{\circ} 25'$, both by account.

17th and 18th May. We walked for 24 miles N. 28° W., which brought us to a point in which we deposited some pemmican, &c., having made another *cache* about 7 miles from our former day's sleeping-place. We also left here a small sledge on which I had hauled from 35 to 50 lbs. since leaving Richardson's Bay, two days excepted. We now traversed a deep and wide bay in direction of N. 40° W., towards some high hills which appeared to be not very far off; but finding that we could not reach the coast there, I turned more to the northward, and ended our night's walk on the W. point of a small bay in lat. $69^{\circ} 17' 30''$, long. $114^{\circ} 7'$ W.

Being anxious to discover how the land looked to the northward, and as a high hill about 13 miles inland would afford the opportunity of obtaining a very distant view, our next day's journey alongshore was only 54 miles, the course being W.

Here I left the dogs and baggage under the care of one of the men, whilst with the other I set out for the hill already mentioned; but unfortunately the walking was so bad that, although we were quite unencumbered, we could get no farther than 10 miles, when we returned rather fatigued to our sleeping-place. Many partridges (*Tetrao mutus*) were seen, but they were so shy that only 11 were shot. These birds are large, and fine eating.

To the large bay we had just traced, and to a range of hills,

of which the most prominent is the one I attempted to reach, I gave the names of Simpson and Colville, in honour of the Governor-in-Chief and Governor of the Hudson's Bay Company's territories.

During the journey of the 19th and 20th the trending of the coast was still to the W. as far as our sleeping-place, on a point with high limestone cliffs, lat. $69^{\circ} 15' 54''$ N., long. $115^{\circ} 24' 54''$ W.

The next night our course was to the N. of W. until within a mile or two of the end of our night's walk, which was in nearly a N. direction, to the head of a small bay, where we took up our quarters, in lat. $69^{\circ} 24' 57''$, long. $116^{\circ} 23' 34''$.

On the 21st and 22nd we travelled nearly N.W. for 5 miles, which brought us to a cape with limestone cliff, at least 170 feet high. This cape was named after Captain Hamilton, R.N., Secretary to the Admiralty.

A couple of miles to seaward there were 13 Esquimaux lodges, and we had an amicable interview with the poor harmless inhabitants, who were rather timid at first, but soon gained confidence. It was difficult to make them understand that no return was expected for some presents I made them. None of the women showed themselves, but all the men were well and cleanly dressed in deer-skin. They were all very fat, having evidently abundance of seals' flesh and fat, large quantities of which were carefully deposited in seal-skin bags under the snow. We purchased a quantity of this for our dogs, and some boots, shoes, and seal-skins for our own use. After a most friendly interchange of signs and words, few of which could be understood on either side, we parted, after six of them had walked some distance with us, both parties apparently equally well pleased with the meeting.

Our course was now N. 36° W. across a bay 11 miles wide, the N. side of which was bounded by a curiously-shaped point, which I called Pullen, after the Commander in the Navy of that name, who successfully performed the voyage from the westward of Point Barrow to the M'Kenzie River in 1849. To the bay the name of Lady Richardson was given. Three miles farther in the same direction brought us to an island which was the terminus of our night's journey. This island is high, but not rocky, and about $3\frac{1}{2}$ miles long. It received the name of Bell, after a chief trader in the Hudson's Bay Company's service. Near it, to the E., there is a small islet, covered with large pieces of rugged limestone.

Next night our course for $7\frac{1}{2}$ miles was N. 33° W. to a point with limestone precipice 70 or 80 feet high. The coast then rounded up to the northward until it attained a nearly N. direction, and for a mile before we ended our night's walk a N.N.E. course into a small bay, where we rested for the day, in lat. $70^{\circ} 00' 23''$ N., long. $117^{\circ} 16' 35''$ W.

The period I had allowed for our outward journey having now arrived, I left our dogs and one of the men here; whilst with the other I travelled half a day's journey farther.

At 8h. 30m. on the 23rd the night was beautiful, as we started with no other encumbrance than a gun, telescope, and compass, so that we travelled fast over the hard snow and ice. After walking 2 miles to the N.W. we turned a cape, which received the name of Baring, in honour of the First Lord of the Admiralty, beyond which the coast took a sudden bend to E. by N. for 8 miles, and then became more northerly for $6\frac{1}{2}$ miles, which was the furthest point reached. A high cape, which was called after Sir George Back, bore N. 73° E., about $7\frac{1}{2}$ miles distant, and bounded our view of the coast in that direction.

Near the place from which I turned back the land was fully 300 feet high, from which objects could be seen at a great distance, and some land 15 or 20 miles off was observed, the most westerly point bearing N. 25° W., the view of its more distant eastern extremity being obstructed by Cape Back.

It is difficult to determine whether the water dividing these two shores is a bay or a strait, but from the little information I could obtain from the Esquimaux I suspect it to be the latter. Unfortunately want of time (as the interests of the summer voyage with the boats required my presence at this place*) would not allow me to decide this question.

Our return was effected at the same quick pace as our outward journey, and we arrived at our *bivouac* after an absence of 10 hours, with excellent appetites for supper, to which, as usual, we did ample justice.

On the 24th of May, at 8h. 25m. p.m., we commenced our homeward route, the details of which I shall not trouble you with, merely remarking that the bearings and distances were carefully checked, and several observations for latitude, variation, and time obtained, which the cloudy state of the weather prevented being taken previously. Where the depth of the bays was at all doubtful I made a circuit round them, whilst the men and dogs followed the straight route.

We had several more interviews with the Esquimaux, all equally friendly as the first. At one of the tents two of the women made their appearance, and were not in the slightest degree timid.

All the land near the coast, from Cape Lady Franklin to Cape Baring, is so extremely barren, that, although many deer cross from the main, they do not remain near the shore, but make their way directly inland, too far for persons travelling as we were, and abundantly supplied with food, to follow them.

* The Coppermine River?—Ed.

On the 30th of May we reached our *cache* of the 16th, and found it, as well as two others, perfectly safe, notwithstanding that one, or perhaps all of them, had been seen by the Esquimaux.

On the night of the 30th we crossed over, in as direct a line as the rough ice would permit, to the high rocky point N. of Cape Krusenstern, traversing a portion of Lambert Island on the way. Next night we reached the S. side of Point Lockyer, where a laughing goose (*Anser albifrons*) was shot; and water was obtained without thawing snow.

On the 2nd of June the extremity of Cape Hearne formed our head-quarters, at which place eleven geese, all in fine condition, were killed.

Being anxious to know if a deposit of provisions left in Icy Cove by Sir John Richardson in 1848, and examined by me in 1849, was still safe, I deviated half-a-day's journey from our direct route in order to visit it; but a deep snow-drift prevented my attaining my object. As the Esquimaux appear to have a great respect for *caches* of any kind, I believe it is still quite safe, unless destroyed by wet, or the barren-ground bear.

Our next sleeping-place was 7 miles N.W. of Cape Kendall. Here ten geese were shot, and double that number might have been got, had we required them.

At 7 h. 50 m. A.M. on the 4th of June we encamped on the S. shore of Richardson Bay, 2 miles E. of where we stopped on the 2nd of May. During the last 2 days there was much water on the ice, and it was evidently high time that our journey should be approaching its conclusion. As the consumption of provisions for the coast journey began here, it may not be out of place to mention that the quantity used in 33 days was 54 lbs. of flour and 128 lbs. of pemmican, or nearly 2 lbs. for each person per diem, with 1½ lb. of tea, 2 lbs. of chocolate, and 10 lbs. of sugar, for all the party during the same time.

We stayed a day here to arrange loads for ourselves and dogs, and to make a *cache* among the rocks, of 30 lbs. of pemmican, 20 lbs. grease (fuel remaining), and several other things which we did not require to carry with us.

On the 5th of June, between 9 and 10 P.M., we started for the Kendall, lightly laden, and came on to within 4 miles of our *cache* of provisions made on the 1st May. One of the men was sent to examine it, but found that everything except an axe had been either eaten or destroyed by a barren-ground bear. We saw a very large one next day, probably the very fellow that had robbed us, but he was too wary to allow us to get within shot of him—possibly he may be less successful in avoiding us on our return to the coast.

On the 9th, when 9 miles from this, a large musk-bull was

shot, and his flesh was found excellent. The skeleton will be preserved.

A short time after midday on the 10th we arrived here, having been 5 days coming from the coast, during some of which we were 14 hours on foot, and continually wading through ice-cold water or wet snow, which was too deep to allow our Esquimaux boots to be of any use.

The latter part of our journey, if not the most fatiguing, was by far the most disagreeable. Through every hollow and valley a stream, more or less large, flowed, some of them so deep and rapid that we had often to walk 3 or 4 miles out of our course to find a ford, and even then it was so difficult to keep on our feet that one of the men fell and lost all our cooking utensils, plates, pans, and spoons, so that for two days we were obliged to use stones as substitutes.

Our principal food was geese, partridges, and lemmings. The latter, being very fat and large, were very fine when roasted before the fire or between two stones. These little animals were migrating northward, and were so numerous that our dogs, as they trotted on, killed as many as supported them without any other food.

The dogs did their work well, considering their leanness when we set out; had they been in better condition, I have no hesitation in saying that our daily journeys would have been 3 or 4 miles longer. We were frequently delayed by rough ice, but when this happened we made up for lost time by additional exertion either on the same or subsequent days.

I subjoin a note of the daily and total distances travelled, counting this place as our starting-point.

I beg to enclose a very rough tracing of the coast examined. It has been done in great haste, and without pretensions to great accuracy, as I have many of my calculations to revise, and several sets of lunar distances to work out. Some islands are also omitted, and the positions of others may require alteration.

In conclusion, permit me to observe that the conduct of the two men who accompanied me has been excellent, and they, as well as myself, are in a much better state for commencing another such journey than when we left Fort Confidence.

Apologising for the hurried manner in which this is written, my only excuse being the anxiety I feel that it should be sent off with the least possible delay,

I have, &c.

JOHN RAE.

DISTANCE TRAVELLED.

Kendall River to Coast, 64 Miles.

May 2 and 3	..	25
3 "	4	.. 27.5
4 "	5	.. 28
5 "	6	.. 20.5
6 "	7	.. 19.75
7 "	8	.. 19.5
8 "	9	.. — stormy.
9 "	10	.. 21.5
10 "	11	.. 21.5
11 "	12	.. — stormy.
12 "	13	.. 19.5
13 "	14	.. 20.25
14 "	15	.. 21
15 "	16	.. 10.50 thick snow
16 "	17	.. 26.75
17 "	18	.. 25.5
18 "	19	.. { 5 along coast. 20 inland.
19 "	20	.. 23
20 "	21	.. 22.25

Carried forward 436

Brought forward	436
May 21 and 22	.. 19.75
22 "	23 .. 23.50
23 "	24 .. 31
24 "	25 .. 23
25 "	26 .. 18.75
26 "	27 .. 23.25
27 "	28 .. 23
28 "	29 .. 24.5
29 "	30 .. 21
30 "	31 .. 16.5
31 "	1 June, 21
June 1 "	2 .. 25.5
2 "	3 .. 23
3 "	4 .. 19.5
4 "	5 .. — did not travel.
5 to 10	.. 75
Geograph. miles	.. 824.25
English miles	.. 942

V.—Recent *Explorations along the South and East Coast of Victoria Land.* By Dr. JOHN RAE.

Communicated by the Hudson's Bay Company.

Read April 5, 1852.

To Archibald Barclay, Esq., Secretary to the Hudson's Bay Company.

Fort Simpson, 27th September, 1851.

Sir,—Having in my report, dated at the Kendall River on the 10th June, and addressed to Sir George Simpson, communicated the details and result of my spring journey over the ice and snow along the Arctic shores, I have now the honour to acquaint you that the boat expedition under my command, which visited the Polar Sea this summer, arrived here yesterday in safety, but I regret to say without having gained any information of Sir J. Franklin and party.

On the 13th June, exactly three days after my return from the coast, the boats from Fort Confidence* joined me at the Kendall river, having made a most expeditious trip across, of only 6½ days.

On the 15th we ran down to the confluence of the Kendall and Coppermine rivers, the water being so high in the former that, although we had on board full cargoes, we did not touch a stone. The latter stream was still covered with ice, which did not break up until the 18th.

* East end of Great Bear Lake.—Ed.

About noon on the 20th, there being a clear passage, we commenced the descent of the river, more for the purpose of getting to better hunting-grounds than for any other object, as the season was still too early for the ice on the coast to be broken up. In the evening we encamped at the great bend of the river, about 7 miles above the first rapid. Here we remained 2 days, during which 6 deer and 4 musk cattle were shot; the greater part of their flesh was partially dried over a fire for future use.

23rd June.—In the evening we ran down to the rapid, which looked so formidable, owing to the great height of the water, that the steersmen, although daring almost to recklessness, would not venture to run the boats down, even without their cargoes.

Consequently, next day a portage was made, and the boats launched over a point of rocks. Finding some of the rapids a few miles further down so very rough, that notwithstanding the excellent qualities of our boats they shipped much water, we encamped again until the river should subside a little, before passing through the more dangerous portions of the stream.

During our stay of 4 days the diminution was so trifling that, my patience being exhausted, we continued our voyage. At every rapid, notwithstanding the care and coolness of the steersmen, much water was shipped, and when we came to the Escape Rapid we found the rock that had endangered the safety of Simpson's boat in 1838 was completely hid from view, showing thereby that the height of water was considerably greater now than at that period; we passed down in safety, but the boats were nearly half filled.

In the evening we encamped at the Bloody Fall, and had not been there more than 15 minutes when 40 salmon and whitefish were taken in a net set in the eddy below the fall.

Having deposited a bag of pemmican and a bale of dry meat, "en cache," on a small island, we proceeded to the mouth of the river, near which we remained for some time, killing deer, fish, and geese, enough to support the party. The weather was extremely beautiful, and the ice along shore wasted fast under the influence of the sun's rays.

On the 5th July a slight breeze from the S. opened a narrow channel along shore to the E., of which immediate advantage was taken, and we gained 22 miles before evening, when our progress was arrested by the fixed ice.

It had been my intention to follow the coast to Cape Krusenstern, and from thence cross over to Wollaston Land, but as the ice, except in Back's Inlet, was still strong and solid to the beach in that direction, I deemed it best to take advantage of the first favourable open water.

Our passage alongshore was slow and difficult. In many

places the ice lay against the rocks, and compelled us to make portages, which, although an arduous duty to those unaccustomed to it, gave my men comparatively little annoyance.

On the morning of the 16th of July we rounded Cape Barrow amidst torrents of rain. From the high rocks, as soon as the weather cleared, a good view to the eastward across Coronation Gulf was obtained; the prospect was far from promising, the whole sea, as far as it was visible, being covered with an unbroken sheet of ice, on which a great many seals were seen. Our day's voyage terminated within 3 miles of Detention Harbour, which is separated from Inman Harbour, on the W. side of the Cape, by an isthmus not more than 200 yards wide.

The passage across the gulf was very slow. We had to make the complete circuit of Moore Bay, and it was not until the 20th that we reached Walker Bay, having found a narrow but very crooked lane of open water among the Wilnot Group, N. of Marcet Island.

On the 22nd a fresh breeze from the S.E. opened a channel across Riley Bay to Cape Flinders, of which we immediately availed ourselves. When near the Cape we had an interview with three Esquimaux, and others were seen on a neighbouring island. These people appeared to have been poorly fed, as they were much leaner than Esquimaux generally are; they had never been in communication with white people before, and were at first much alarmed, but we very soon gained their complete confidence.

We arrived at Cape Alexander on the 24th, being two days earlier than Dease and Simpson in 1839.

The ice in the strait was still unbroken, but along-shore eastward, as far as visible, there was an open passage of a mile or more in width; this, however, was of little advantage, as my intention was to cross from our present position to Victoria Land, the strait being here narrower than at any other point.

Had geographical discovery been the object of the expedition, I would have followed the coast eastward to Simpson Strait, and then crossed over towards Cape Franklin. This course, however, would have been a deviation from the route I had marked out, and would have exposed me to the charge of having lost sight of the duty committed to me.

The ice having broken up on the 27th, we pushed our way among the loose pieces to the nearest of the Finlayson Islands, and had afterwards little difficulty in reaching the one nearest to Victoria Land, on which we passed the night, as the ice was again in our way. A gale of N.W. wind having, during the next night and morning, dispersed the ice, we made our way to a point equidistant from our resting-place and the head of Cambridge Bay.

Here we found shelter in a creek, the entrance to which swarmed with salmon, and 90 were caught by running a net across the stream; few of these were large, the average weight being about 5lbs., and the greater number of them, having spawned, were in poor condition.

Late on the night of the 29th, we arrived at the north-eastern extremity of the bay, as laid down in the charts by Dease and Simpson; but I found that it extended several miles farther, taking a bend to the westward and forming an excellent harbour, with a sufficient depth of water for vessels drawing upwards of 24 feet, and having good holding-ground of sand or mud. Into the W. side of this harbour a rapid river, about 50 yards broad, of beautifully clear water, empties itself. This stream flows from a lake of considerable extent some miles inland, and appears to be a favourite resort of the natives, judging by the numerous stone-marks and several "caches" of provisions, clothing, &c., deposited on its banks. Doubtless this is an excellent fishing station immediately after the breaking up of the ice, as many salmon were still seen sporting in the transparent waters in the vicinity.

During the next two days a gale from the W. and W.N.W. made so much havoc among the ice that there was a clear passage open to the E. point of the bay; and on the 1st of August, 11h. A.M., the wind being still fair and more moderate, we started, but had not been off more than ten minutes when it chopped round directly in our teeth and blew a gale, against which, having lowered the masts and sails, we had great trouble in making way with the oars. At length we reached a small island in the bay; from thence, by plying to windward, under close-reefed sails, at about 4 P.M., we doubled the point. Our course being now E. the wind was fair, and, aided by the flood-tide, an hour's sailing brought us to Cape Colborne, where the examination of untraced coast commenced.

The shores at Cape Colborne are high and steep, but became gradually lower as we sailed eastward. When 7 miles E. of the Cape we landed to cook supper; after 45 minutes' stay we were again under sail, and very soon came to the W. point of a bay running up to the northward. This bay was found to be 8 miles wide, and apparently about 6 miles deep. Its eastern shore is low, and could not have been seen by Dease and Simpson from any point in their route; no doubt some high ground I saw inland was mistaken by them for the boundary of the coast. I have, therefore, in the rough chart which accompanies this report, taken the liberty of transferring the name of Point Back to the W. point of the Bay, whilst the Bay itself is called Anderson Bay, in honour of the Right Rev. the Bishop of Rupert's Land.

The weather remaining fine and the wind fair, we continued

under sail all night, our course being slightly to the southward of E. The shore was low, indented with small bays, and having several islets lying near it.

After advancing nearly 16 miles we arrived at a bay of considerable extent, across which, as the breeze freshened, we ran rapidly. The farthest visible point bore E. (true); and the bay being 11 miles wide, we were about 2 hours in crossing. Here I was surprised to find the flood-tide coming from the eastward, as hitherto it had flowed from the opposite direction. To this bay the name of Parker was given. Its W. point I named Sturt, after the celebrated Australian traveller; and its eastern boundary received the appellation of Macready, in honour of the distinguished tragedian. When we had sailed nearly 3 miles farther, we put on shore for breakfast. During our stay, high land, having the appearance of a large island, was observed through the haze, bearing E. by S., and apparently about 18 miles distant. Fuel being extremely scarce, we were detained $1\frac{1}{4}$ hour here.

Immediately after getting under weigh again, we commenced the examination of a curiously-shaped bay, having an island 2 miles in extent near its centre, and being divided into two narrow inlets near its head, by a long projecting point. The most northerly of these inlets was admirably sheltered; but I cannot speak with confidence of the depth of water, as I did not examine it closely. The name of Stromness was bestowed on this bay.

Some time having been spent in examining the shore and taking bearings, it was 10h. 45m. A.M. when we passed the E. boundary of the bay, a low stony point, fronted with limestone rocks a few feet in height, which was named Kean Point.

The coast now turned to the N.E.; and having a single-reef breeze right aft, with smooth water, the little boats ran along swiftly.

About noon we passed among a cluster of small islands, in the channels between which the flood ran strong against us. I landed on one of these islands, and observed the latitude to be $68^{\circ} 52' 21''$ N.; the variation $68^{\circ} 30'$ E.

The island already mentioned as having been seen from Point Macready was now not more than 10 miles distant. It appeared to be fully 15 miles in extent, high towards either end, but low in the middle. It was called *Lind*, in honour of one whose sweetness of voice and noble generosity have been the theme of every tongue.

The general trending of the shore was still N.E., but its outline was irregular, being broken into strangely-shaped bays and points. Having advanced 13 miles, we came to a point where the coast turned abruptly to the N. Tracing it for 8 miles, we found ourselves near to what looked like the head of a bay; but on closer

examination a very narrow channel leading northward was discovered. It was so completely blocked up with ice as to be un-navigable.

Altering our course to S.S.E., we ran round the S. end of Taylor Island, so named as a tribute of respect to the memory of the late much-regretted President of the United States. We here got among very heavy and closely-packed ice, which we anticipated from having some hours before seen several very large floes aground in 5 fathoms water. The ebb-tide being strong in our favour, we made good progress to the north-eastward, running some risk occasionally of being nipped between the floating and grounded masses.

About 8 p.m. we landed for a short time, and then pushed on again, and at 11h. 40m. on the 2nd August put on shore for the night under shelter of the most easterly point of the island, on the outer extremity of which the ice was forced up so as to form an insurmountable barrier to further advance. The place at which we landed and its neighbourhood were barren in the extreme. Scarcely a vestige of vegetation, and not a bit of drift-wood, were to be seen; nothing but a level tract of light grey coloured limestone, which had been forced up in immense blocks close to the shore by the pressure of the ice. The stone was in many places covered with minute brown-coloured crystals.

Next day our position was ascertained by observation to be in latitude $69^{\circ} 12' 20''$ N., longitude by chronometer $101^{\circ} 58' 15''$ W. The variation of the compass was found to be $58^{\circ} 58'$ E.; but as the needle was extremely sluggish, and evidently acted upon by local attraction, little reliance could be placed upon it.

It will be observed that we had been extremely fortunate, and had made an excellent run of more than 100 miles without a single stoppage except the detention requisite for cooking.

During the whole of the 3rd August there was a gale from N., with heavy squalls and showers of sleet and snow. In the intervals between the showers, land could be seen to the N.W. by N., and N.E. (true), apparently 12 to 15 miles distant; but the horizon was never sufficiently clear to permit a distinct view of it.

The weather on the 4th continued much the same; but about 11h. a.m. the wind fell a little, and having shifted a point or two to the westward, a lane of water along shore was opened, up which we pulled to the N.W., until we doubled some reefs which stretched out a few miles to seaward. Having rounded these, we got into open water, set close-reefed sails, and stood towards land, close hauled on the starboard tack, steering W.S.W. There was an ugly chopping sea running, but the boats behaved admirably; and a run of little more than five miles brought us to the shore.

The wind again set in from the N., increasing to a perfect gale; and although we could gain ground pretty fast by plying to windward, our slightly-built craft strained so much in the heavy seas that frequently washed over us—in fact, one of the boats had a plank split—that we lowered sails on gaining a partial shelter from the land, and after a tough pull of two miles, during which we were sometimes barely able to hold our ground, we entered a snug cove, and secured our boats.

August 5.—The weather was still stormy, and finding that no headway could be made with the oars, our sails were again set, and we turned up to windward until the gale became too violent for our most reduced canvas; there was consequently no help for it but to put ashore, which we did on the north side of a long narrow bay, having gained about 6 miles. Satisfactory observations were here obtained, giving latitude $69^{\circ} 20' 55''$ N., longitude by chronometer $102^{\circ} 30' 2''$ W., and variation $68^{\circ} 56'$ E.

On the 6th we could not start until the evening, and then advanced only 8 miles, at first to the N. by E., and afterwards to the W.N.W., passing some limestone cliffs of considerable altitude faced with deep snow banks.

A very thick and cold fog coming on, which encrusted every article with ice, we landed, and were soon snug in our tents. Here a quantity of drift wood was found, being the first we had seen of any size since leaving Cape Alexander. The wood was poplar, and must have grown on the banks of the Mackenzie, or some of the rivers near it.

The well-marked cape on which we now were was named in honour of the Princess Royal. It presents a precipitous front to the E. and N.E.

Next day being clear and fine, observations were obtained, which gave the latitude $69^{\circ} 27' 6''$ N., longitude by chronometer $102^{\circ} 27' 12''$ W., and variation $72^{\circ} 30'$ E. The bearings of several islands and points in sight having been taken, we pulled out from shore due north, towards the highest visible land, passing between two islets near the shore. We were 7 hours crossing, the distance being fully 20 miles, and the current during the greater part of the time against us. Soundings were taken regularly, the greatest depth being 22 fathoms on a bottom of mud.

Our landing place was a small point in a bay, on the shore of which, about a mile inland, were a cliff and some high ground, from which I had a good view of surrounding objects. To the S.E. there was a small peninsula a few miles in extent, connected with the shore by a very narrow ridge. Off the point west of us there was a number of low stony islands or reefs extending to the southward 4 or 5 miles: beyond this, in the same direction, was an opening in which no land was visible. Directing our course, under sail,

towards this apparent passage, we passed between the most northerly of the reefs above-mentioned and the shore, through a narrow channel, having barely sufficient depth of water for our boats, and continued advancing in the same direction until it fell calm at 2 h. 30 m. A.M. on the 8th, when we landed on a small island at the entrance of a narrow inlet running N. Here we passed the remainder of the night.

It was past 7 next morning before we were under weigh again, and as there was no wind, we pulled up the inlet with the hope that it might prove to be a passage northward, but in this we were disappointed. When half a league from the head of the inlet we landed, and ascertained our position by very excellent observations to be in latitude $69^{\circ} 56' 2''$ N., longitude by chronometer $102^{\circ} 30' 46''$ W. After this we pulled down to the southward, and put ashore on the west point of the inlet to pick up a piece of pine, the dimensions of which were 18 feet long by 10 inches diameter. As the wood was straight-grained and free from knots, it had doubtless been carried to the sea by some stream far to the west of the Coppermine. The wood being perfectly dry and not at all decayed, furnished us with sufficient fire-wood for several days' consumption.

From some elevated ground in the vicinity land was seen from W. to the S.S.W., and as there were no indications of Esquimaux having recently visited the several points we touched at, and no signs whatever of Europeans having ever been on this coast, I considered that it would be a waste of time to examine the bay more closely. Having pushed off, we took a direct course towards the small peninsula, mentioned as having been seen the day before.

Here we landed at 9 h. 25 m. P.M. Several snow owls (*Stryx nicta*) were seen, and I may add, that these beautiful birds were to be found all along the shore of Victoria Land, wherever there were any elevated spots of ground or large stones for them to perch upon.

A light breeze of north wind that had prevailed for some time having increased in force, we again started and stood to the eastward under sail across a deep bay, with the ebb tide strong in our favour, until we passed between two small islands, where we were met by the flood. In 2 hours, having run between 7 and 8 miles, we were abreast of the east point of the bay. As we advanced, turning slightly to the northward of E., we passed two more bays of small size. On the farthest point of the most easterly one the ice lay fast aground and too closely packed to permit a passage: we consequently landed under the lee of the point at half-past 3 A.M. of the 9th.

August 9.—There was a gale of wind from N.N.E. during the

greater part of the day, with a temperature of $+ 30$. The weather was cloudy, but at noon a glimpse of the sun allowed me to obtain the latitude $69^{\circ} 41' 2''$ N. The weather in the evening being fine we pushed off, and, by pulling and poling, forced our way upwards of a league northward, when all further efforts to proceed proved fruitless.

The prevalence of north-easterly winds during the remainder of our stay here kept the ice close to the shore; and in the offing to the eastward, nothing but large pieces of very heavy ice, thrown up in great confusion, was to be seen. By observation our latitude was $69^{\circ} 42' 45''$ N., longitude by chronometer $101^{\circ} 23' 42''$ W. The compass was here perfectly useless, being acted upon, I suspect, by the large quantities of pyrites that were strewn along the beach.

On the 12th, finding that there was little or no prospect of change in the wind, preparations were made for a foot journey of a week's duration to the northward. Leaving therefore directions that one of the boats should follow us along shore if the ice cleared away, I started a short time before noon in company with three men, and, as we trusted to killing both deer and geese on our way, we carried with us provisions for only four days.

Hoping to avoid the sharp and rugged limestone debris with which the coast was lined, we at first kept some miles inland, but with trifling advantage, as the country was intersected with lakes, which obliged us to make long détours. Nor was the ground much more favourable for travelling than that nearer the beach; being, in fact, as bad as it could be, in proof of which I may mention that, in two hours, a pair of new mocassins with thick, undressed buffalo-skin soles, and stout duffle socks, were completely worn out, and before the day's journey was half done every step I took was marked with blood.

We gained a direct distance of 17 miles after a walk of 24 hours, and bivouacked near the shore. Although we had passed a good many fine pieces of drift-wood some time before, here we had some difficulty to collect enough to boil the kettle.

Opposite our resting-place, and not far from shore, was an island some miles in extent, to which I gave the name of Halkett.

Next morning, when we had travelled 3 miles northward, a large piece of wood was found, very opportunely about breakfast time. As the travelling continued as bad as ever, and as the whole party were more or less foot sore, I resolved to remain here to obtain observations, notwithstanding which two of my men pushed on 10 miles to the N., and the other went to kill deer.

The results of my observations were lat. $70^{\circ} 2' 36''$ N., long. $101^{\circ} 24' 47''$ W., and variation $89^{\circ} 30'$ E. The compass tra-

versed here much more freely than it had done for some time past, which may possibly be accounted for by there being no appearance of iron in the vicinity.

In the evening the men returned rather lame, having, as I just stated, walked 10 miles, as nearly as I could estimate by the time they had been absent. Their view northward was limited to 7 miles, and the whole shore presented the same dreary, uninteresting aspect, being low, flat, and stony. To the farthest point seen I gave the name of Pelly, in honour of Sir J. H. Pelly, the Governor of the Hudson's Bay Company.

Next morning we commenced our return, and reached the boats in 8½ hours. During this short journey many deer were seen, and at least half a dozen might have been shot had it been necessary, but we killed only two. These were in high condition.

The people left with the boats had, according to my orders, erected a couple of stone cairns. Near the summit of one of them a short note of the object and proceedings of the expedition was deposited.

On the 15th the wind continued to blow most obstinately from the N.N.E., and as our boats were now in a dangerous position should the wind shift more to the eastward, I determined to run back a few miles to a safer harbour, where we could wait any favourable change in the wind and ice, and also, if an opportunity offered, make an attempt, by getting under the lee of Admiralty Island, to cross over towards Sir James Ross's Point Franklin, only 40 miles distant.

I omitted to notice that this island had been observed and bearings taken of it on the 8th of August. Having taken possession of our discoveries in the name of her Majesty Queen Victoria, we started, but a little before noon the breeze increased to a gale, shifting two points more easterly, and there being a great accumulation of ice between us and the Admiralty Island, I sought shelter under the lee of a point in latitude 69° 40'. Here our stock of provisions being low, three deer were shot.

Large flocks of geese were migrating to the S.S.W. Golden plover and other small birds appeared to take a S.E. course, possibly to visit the shores of Hudson Bay on their passage southward.

On the morning of the 16th it blew hard from N. until 9 A.M., when, the wind subsiding a little, we made another attempt to push across to Admiralty Island, but with as little success as before, there being even more ice in our way than on the preceding day.

Being unable to advance either to the northward or westward, I occupied the time in examining more closely the bay in which we now were, and which I named after his Royal Highness the Prince of Wales.

We steered nearly S.W. by W. (true) as soon as the ice would allow, and as the ebb tide was carrying us somewhat to the northward, we made about a W.S.W. course, and after advancing 21 miles we landed at 9h. 45m. P.M. near some limestone cliffs, on the S. shore of a long point that projects into the bay in lat. $69^{\circ} 32' N.$, long. $103^{\circ} 10' W.$

During the early part of the 17th there was a thick fog, so that while coasting to the W. by N. we had to hug the shore.

At 9h. 30m., when on shore for breakfast, the weather cleared up, and excellent observations were obtained, giving lat. $69^{\circ} 33' 5'' N.$, long. $103^{\circ} 33' 49'' W.$

We afterwards pulled 7 miles W. by N. (true) obliquely across a strait to a point on which I landed to take bearings and obtain a view of the coast. Land was seen all round forming a wide bay. Near us, to the E., was a deep, narrow inlet running S., which was examined. After leaving the inlet we steered S.E. $5\frac{1}{4}$ miles to a small island, where we landed to pass the night.

Our course the following morning was extremely devious, as there was so thick a fog that it was necessary to follow closely all the windings of the shore. In the forenoon and at noon our longitude was $103^{\circ} 7' 21'' W.$, lat. $69^{\circ} 24' 51'' N.$ Variation of the compass $77^{\circ} 30' E.$

The general direction of the coast afterwards for 10 miles was N.E. by N.; it then turned to E.S.E. until we arrived at the most westerly of the two islets near our position on the 7th of August. We landed on the small island for a short time, and were again afloat at 9h. 40m. P.M., when we pulled E. by S. to another island $9\frac{1}{2}$ miles off, at which we arrived a little after midnight. Here the fresh track of a large white bear was seen.

On the morning of the 19th another attempt was made to force a passage eastward, but after an advance of $3\frac{1}{4}$ miles we reached the close pack, and there was no alternative but to pull back.

Having landed on one of the islands, a round of bearings was taken, after which, the wind being still from the N.E., we commenced our voyage homewards. Seeing that the ice lay close on the E. side of Taylor Island, I steered between it and Victoria Land, and found the channel dividing them open. It is about 50 yards wide and 8 feet deep at its narrowest part.

In the evening we were much annoyed by both the old and new formed ice. The latter would have speedily cut our boats through, had we persevered in pushing through it.

The morning of the 20th August being very fine and clear, land was seen in one or two directions in which it had not been previously noticed, and bearings were taken of it. The young ice did not thaw until 10h. A.M.; after which, by great perseverance,

we made very tolerable progress. Working all night, and sometimes aided by the sails, at 7h. 15m. a.m., on the 21st, we landed on the W. shore of Stromness Bay, and after staying 2 hours again pushed on; but the ice being lighter, and consequently more closely packed on the shore, we had greater difficulty in making headway, and were at last obliged to wait the rise of the tide at a point in Parker Bay.

Having remained here 3 hours, and had an interview with a party of Esquimaux, at 3h. 30m. p.m. we again commenced creeping along shore, and had proceeded but a short distance when a piece of pine-wood was picked up which excited much interest. In appearance it resembled the butt end of a small flag-staff, was 5 feet 9 inches in length, and round except 12 inches at the lower end, which was a square of 2½ inches. It had a curious mark, resembling this (s c), apparently stamped on one side, and at 2½ feet distance from the stem there was a bit of white line in the form of a loop nailed on it with two copper tacks. Both the line and the tacks bore the Government mark, the broad arrow being stamped on the latter, and the former having a red worsted thread running through it.

We had not advanced ¼ mile when another piece of wood was discovered lying in the water, but touching the beach. This was a piece of oak, 3 feet 8 inches long. The lower part, to the height of 1½ foot, was a square of 3½ inches. Half of the square, to the extent of 6 inches at the end, was cut off, apparently to fit into a clasp or band of iron, as there was a mark of 3 inches broad across it. The remaining part of the stanchion (as I suppose it to have been) had been formed in a turning-lathe, and was 3 inches in diameter.

As there may be some difference of opinion regarding the direction from which these pieces of wood came, it may not be out of place to express here my own opinion on the subject.

From the circumstance of the flood-tide coming from the northward, along the E. shore of Victoria Land, there can be no doubt but there is a water-channel dividing Victoria Land from North Somerset, and through this channel I believe these pieces of wood have been carried along with the immense quantities of ice that a long continuance of northerly and north-easterly winds, aided by the flood-tide, had driven southward. The ebb-tide not having power enough to carry it back again against the wind, the large bay immediately S. of Victoria Strait became perfectly filled with ice, even up to the S. shore of Victoria Land. Both pieces of wood appear to have come to shore about the same time, and they must have been carried in by the flood-tide that was at the time flowing on during the previous ebb; for the simple reason, that although they were touching the beach they did not rest upon it.

The spot where they were found was in lat. $68^{\circ} 52' N.$; long. $103^{\circ} 20' W.$

All the night of the 21st we continued our course, sometimes having to cut a passage for the boats, at other times finding a channel wide enough to allow us to use the oars. On the afternoon of the 22nd, when within 4 miles of the E. point of Anderson Bay, we entered open water, and there being a fine breeze of N. wind sail was set. At 7h. 45m. P.M. we landed on Point Back, to pass the night, as the wind had fallen and the tide was against us.

The morning of the 23rd was very foggy; but a light breeze from the S.S.E. sprang up at 4h. 25m. A.M., and we sailed and pulled along shore to the E. point of Cambridge Bay, near which we landed at 9h. 45m. Here we repaired some injury one of the boats had received, and were off again at 1h. P.M. The flood-tide being against us the most part of the distance, we did not pass the most westerly of the Finlayson Islands until 8h. 10m. P.M., and a few miles further on we landed on a rocky point to cook. After 1 hour's detention, the breeze being favourable, we continued our course, and during the night rounded Wellington Bay, which does not run nearly so far to the northward as is represented by Simpson. The nature of the ground, which is low near the sea, and high some miles inland, may have easily led to an error on Simpson's part, as he merely ran across the mouth of the bay without entering it.

As the morning of the 24th dawned, the wind which had been blowing fresh from S.E. by E. gradually increased to a gale. Reef after reef was taken in, until we were under our smallest canvas. A very heavy sea was running which washed over us now and then, from stem to stern, and bent and twisted our slight-built but fine little craft in every direction. At last the weather became so bad that I was reluctantly obliged to look out a harbour. This was dangerous work, as we had to run almost among the breakers before it was possible to see whether the place we made for would afford a shelter; but we were fortunate, and at 9h. 30m. A.M., when 8 miles N.E. of Cape Peel, we were snugly moored in a small land-locked bay, the entrance into which was not 20 yards wide.

During the whole of the 25th there was a storm from the eastward; but at night the wind shifted to N.N.W., with an ugly cross sea. A little after 7 A.M., on the 26th, we stood out under close-reefed foresail, and at 9 doubled Cape Peel. At 5 P.M. the wind fell and shifted round to S.W., and $\frac{1}{2}$ hour afterwards we landed about 4 miles W. of Byron Bay. After 3 hours' rest here we rowed onwards until 10h. P.M., when the wind again favoured us, and we sailed on until the darkness of the night and the heavy

sea caused us to beach the boats. Our present position was 16 miles W. of Byron Bay.

Next day the wind being again favourable, we made a good run, and landed for the night on the S.W. shore of one of the largest of the Richardson Group, in lat. $68^{\circ} 32'$ N.; long. 111° W.

On the 28th, when we landed for breakfast at Point Ross, some observations were obtained which verified the position previously laid down by me in the spring journey. From this place our run to the Coppermine was uninterrupted. Stopping only once to cook, we sailed all night. At 3h. 30m. A.M., on the 29th, we passed by the S. end of Douglas Island—at 5h, abreast of Cape Krusenstern—at noon, opposite Cape Kendall—and between 7 and 8 reached the Bloody Fall, not having seen a bit of ice since leaving Point Back.

Our consumption of provisions from the 20th June until this date was—

* 4 bags pemmican, 90 lbs. each.

4½ bags flour.

150 lbs. dry meat (principally given to our dogs).

70 lbs. fat.

—
About 11 pieces.

Twenty-one deer had been shot on the coast; and many more could have been killed had I permitted it.

The water being very high in the river, I remained 1 day to allow it to subside, and our time was occupied in strengthening one of the boats for the ascent of the stream. The other boat was to be left behind.

On the 31st, although the water had fallen 12 inches, it was still much above its usual level; but as I had every confidence in the skill and coolness of my men, we commenced our upward course.

I believe the Coppermine was never ascended in so dangerous a state. The ledges of rock along the base of the cliffs, which in the worst part of the river had afforded footing to Dease and Simpson's party in 1838 and 1839, were covered by water, in consequence of which the men had to walk with the tracking line along the top of the cliffs. In doing this, although the line was a strong one, it snapped four times, and other means were resorted to. After five days' most arduous and dangerous duty, during which the conduct of the party was most praiseworthy, we entered the Kendall River, and encamped on its banks.

Simpson says somewhere in his narrative that it is impracticable to take a boat across from the Kendall to Bear Lake, or *vice versa*,

* Two of these being rotten and mouldy were boiled down to obtain the grease.

at any season except during the floods in spring. I was desirous of making the attempt, as by getting one of our light sea-boats into the M'Kenzie much time would be saved on the portages *en route* to Athabasca.

Now that the high-water would have been an advantage, we had the mis-fortune to find that it had fallen to its usual summer-level; nevertheless I determined to try the experiment, and, I am glad to say, with perfect success.

On the 5th and 6th we ascended the Kendall, and traversed the Disual Lakes, at the north-western extremity of which we arrived about 3 P.M. on the last-mentioned day. The guide was immediately sent to find the best route to the N. branch of the Dease, whilst the remainder of the crew carried the baggage a portion of the way over the portage.

To give a detailed account of the difficulties we met with and overcame, would occupy too much space in a report like this. It is sufficient to remark that on the afternoon of the 10th September we arrived at Fort Confidence, where I found everything in good order, and more than 3000lbs. of dried provisions in store.

Having given my assistant, Mr. M'Kenzie, instructions regarding the payments to be made and the gratuities to be given to the Indians, I started at 10 P.M. on the 11th in the small boat with four men and one Indian for Fort Simpson, and arrived there on the 26th, having been impeded in the M'Kenzie River by continued head wind.

Late the next evening the large boat came up, and the party were again united.

In concluding this report, I have to express my satisfaction at the good conduct of most of my men. Two of the party, my assistant and a Canadian half-breed, did not behave well; but the others fully made up for any defects in these. Had there been a few steady European servants in this expedition, it would have been one of the most efficient that ever visited the Arctic Sea. For voyaging, either during winter or summer, no men could be better than those I had; but for several other duties they were not so well adapted as the men engaged by the Company in the Orkneys or Hebrides.

I have the honour to remain,

Sir, your most obedient servant,

JOHN RAE.

VI.—*Brief Geographical Sketch of the Friendly Islands, with an Account of the Visit of H.M.S. Meander, Captain the Hon. Henry Keppel, to the Island of Tongatabu, June, 1850.* By O. W. BRIERLY, Esq., F.R.G.S.

Read December 8, 1851.

THE Friendly Islands.—The Friendly or Tonga Islands consist of three separate groups, and are situate in the Pacific, between 18° and 23° S. latitude, and 173° and 176° W. longitude.

There are said to be in all more than 150 islands; 15 of which rise to a considerable height, 35 are moderately elevated, and the rest are low.

The most southern group (the Tongatabu Islands) was discovered by Tasman in 1643. The Island of Tongatabu is the largest of these, and is about 20 miles long by 10 wide at its broadest part. The general surface of the island, with the exception of a few hillocks varying from 30 to 40 feet in height, is nearly a dead level; the highest part of the island is a small mount about 60 feet above the level of the sea on the northern side.

The Central, or Haabai Group, is composed of a considerable number of small islands, the most populous being Lifuka, about 8 or 9 miles long by 4 broad. The islands of this group are very fertile, some of them are low, others are of considerable height, and among the latter are Tofua and Kao. Tofua has an active volcano.

The Vavan Islands form the most northern group, and are somewhat larger and higher than the Haabai Islands. Vavau is a fine island, about 36 miles in circumference; its surface is uneven, and on the northern side it rises to considerable elevation.

The climate of the Friendly Islands is humid, and the heat rather oppressive, rising frequently to 98° in the shade. Much rain falls periodically. The trade winds are not constant, and westerly winds occasionally blow in every season.

Very heavy dews fall at night, and the transitions from heat to cold are very sudden. Hurricanes are frequent, scarcely a season passing without them. The months of February and March are those in which they occur, but they have been known to take place in November and December.

The storms begin at N.W., going round to the E., and ending in S.E.; the wind continues to increase until it becomes a hurricane, and is frequently observed to change almost immediately from one point to the opposite. In the same group of islands trees have fallen during one gale, some to the S. and others to the N. Earthquakes are also frequent.

These islands are remarkable for their fertility and the variety of their vegetable productions, abounding in fruits indigenous to tropical climates, such as the cocoa nut, bread fruit, banana, pine apple, orange, citron, lime, custard apple, and others. Yams, melons, and pumpkins are also very plentiful, and of excellent quality.

The population of all the groups is estimated by the missionaries at about 50,000; that of the Island of Tongatabu is said to be about 9000, of which 5000 are Protestants, 600 Roman Catholics, the rest remain in their old faith.

The government of the islands is despotic, and not hereditary, but elective in the royal family. The eldest son of the king does not necessarily succeed his father, but another may be chosen from the sons of a former king, or a younger son may be elected before an elder if he be thought to have more capacity for government.

There are some individuals connected with the priesthood, who are considered superior in rank to the kings, and to whom the kings do homage. The Tamahá is one of these, and is considered to be descended from the gods. The present Tamahá is a very old woman, quite blind, who remembers the visits of Captain Cook, and, although a Christian for many years, she still retains her rank as the first person in the Tonga Islands.

George, the present King of the Friendly Islands, has only been ruler over the whole of the three groups, composing them, since the year 1845. Before this he was King of the Haabai group only, Josiah Tubou being King of Tonga, and Feenau King of Vavau. When Feenau died, George became King of Vavau as well as of Haabai, and Josiah, King of Tonga, dying in 1844, George became Tui Kanakubolu, and now reigns over the whole of the Friendly Islands. He has professed Christianity for about twenty-one years.

The Meander, Captain Keppel, sailed from the Bay of Islands, New Zealand, on the 10th of June, 1850.

At daylight in the morning of the 19th we made "Ena," an island situated on the eastern side of Tongatabu; and soon afterwards the tops of the cocoa-nut trees upon Tonga itself were seen along the horizon to the westward.

At 8-30 A.M. we fired two guns, and kept away N.W. by W., steering for an opening between Tongatabu and a small islet called in the chart Ena-Eki.

Upon nearing the eastern side of Tongatabu, very heavy rollers were seen along the shore of the island, the surf upon the reefs being thrown up to a great height, the scrub being all beaten down, and the cocoa-nut trees appearing farther inland than in other places. Seeing no canoes or natives, we fired a third gun, and shortened sail to topsails, sending up the colours and the signal for a pilot. Soon afterwards a canoe was observed coming off, and the ship

tacked to meet her. It was about 15 feet in length, without any carving or ornament, and having a single outrigger. There were four natives in it, all naked with the exception of a little tappa, or native cloth, wrapped round the waist, and reaching down to the knee. They came out against a heavy swell, often dashing right through the crests of the waves, which at times broke completely over them. They were talking to each other with great rapidity and animation as they approached, and, as we looked at them, not at all expecting to hear anything we should understand, one of them hailed us in perfectly good English, "Square the main yard!" As this had been already done some short time before to allow the canoe to come up with us, this speech was no doubt intended to show us how well he could speak English. A rope being thrown over, one of them scrambled up the side, the canoe pushing off again with the rest. The native who came on board was a fine man about six feet in height, with really handsome features, and a fine open expression that was quite prepossessing. He was tattooed upon the breast and across the back of one hand, and had lost one of his fingers. When he came on deck he announced himself as a pilot, asked whether we were English or French, and then pointed out the passage through the reefs to the anchorage, watching the ship, and saying "very good," as she came up to her course, and then, going forward, took up his station on the bowsprit. The entrance to the anchorage is between a mass of coral reefs and islets on the northern side of the island, and is very narrow, but our native pilot showed the greatest coolness and judgment in conducting us through it. Within the entrance the anchorage spreads out into a bay with deep water right up to the reef which skirts the shore.

Owing to the want of high ground there is nothing very striking in the appearance of the island, which from the sea forms a continuous line of palms rising over a beach of coral, the highest part being the small mount opposite the anchorage at Nu-ku-alófa, on which stands the native church and a small stone, marking the grave of Captain Croker, of H.M.S. "Favourite," who was killed at Bêa, in the island, in 1840. Upon the beach were some very large sheds, and many pretty huts enclosed by neatly made fences.

When we had anchored, a whole fleet of small canoes, bringing crowds of natives, came off to the ship. In the afternoon a party was made up to go on shore. At the landing-place we were met by a large troop, principally children and young women, with two or three young men, one of whom carried a bayonet fixed upon the end of a pole. The women were dressed in short jackets of coloured cotton, with sleeves reaching down to the elbows, and petticoats of tappa fastened round the waist. As we were going away to look for the houses of the missionaries, a native came

running up to tell us that they were on their way down, and shortly afterwards we were met by two of these gentlemen, Mr. Lawry and Mr. Amos, whom we accompanied to their houses. The road lay between rows of very neatly made matted fencing, by which the town was divided into regular lanes, shaded by the cocoa-unt trees and bananas which grew on each side, forming beautiful avenues over them. The missionaries had very neat cottages with green lawns before them: and we recognized, among many beautiful island plants, the rose and a variety of English flowers, together with peas and other vegetables, all of which appeared to thrive well. By the time we had made our call here it became too late to see much more that night, and we returned on board.

The following morning (June 20th) I accompanied Capt. Keppel and a party to see an examination of the native school. The scholars were all assembled upon a lawn within a fence, which enclosed the school-houses and huts of the native teachers; these were principally young women and girls—and like those we had seen upon landing, wore a kind of upper body dress of coloured cotton hanging loosely over the shoulders, with petticoats of tappa partly gathered into folds round the waist. Many had a species of convolvulus wound a great many times round the waist, surrounding the body with a mass of leaves and flowers; and all had their skins rubbed over with cocoanut-oil, which they use both as a protection from the sun, and because they think it adds to their beauty. Most of them had cotton bags containing their books and writing materials; and those who had not bags carried them carefully wrapped in pieces of new tappa. They were arranged in ranks placed so as to form three sides of a square; and one of the missionaries, standing in the centre, directed their movements by a whistle which he carried. At a preparatory call all the monitors came out and stood apart from the rest, and at a second signal they formed in line, and, led by the missionary, started off at a moderately quick step; the rest of the scholars falling in behind, all chanting at the same time in full chorus, the procession winding backwards and forwards until they formed a figure four deep. Other figures were then formed, until a signal from the missionary called a halt, and they went into the "Fāle Lautóhi," or reading-room, a large house built in the native style, where they sat down on the ground in six rows, the young women and girls being placed in the middle lines. A large number of the people attended, sitting on the ground outside. The examination opened by the scholars singing a hymn, then repeating portions of the Catechism, and going through the Multiplication Table; reading chapters from the Bible, writing and geography also formed part of their exercises. In repeat-

ing the Multiplication Table they accompanied themselves by clapping their hands in time to the words, throwing the arms from side to side, all calling out at the same time at the top of their voices, and seeming to enjoy the whole affair amazingly. An old chief of considerable influence, named Shadrack, sat with the missionaries at the head of the school, and whenever the crowd outside talked too loud he commanded silence.

After this examination was over we visited another school, for the instruction of native teachers, which consisted of about twenty persons in all, principally chiefs and their wives. When we entered the school-room they were all standing up round the sides of the apartment, reading aloud. They were taught English, arithmetic, geography, writing, &c. After the reading and ciphering exercises were over, they sat down in two rows before a frame containing a set of large maps. These were drawn down, one after another, the natives repeating the names of the places, with particulars respecting them, as they were severally touched by the missionary. Captain Keppel then desired them to point out various places which he named. Spain, being the first, was immediately pointed out by a chief, Shadrack Moomie, Judge of the Island and a son of the late king. The end of the rod was then shifted slightly over, so as to rest upon Portugal, which Shadrack immediately named; and being asked to point out some islands in the Mediterranean which were mentioned, he did so readily. Being desired to show the track which should be taken by the Meander, for England, he at once traced it correctly. The rest of the pupils appeared equally intelligent. Several of the wives of these chiefs were present, and were treated by the men with marked attention, being seated in the foremost places. The missionaries call this "the native training institution," or school for educating native teachers. At the time of our visit there were twenty-four natives under this kind of instruction—eight being from the island of Vavau, six from Haabai, and ten belonging to Tongatabu. Besides these there are twelve female students, eight of whom are wives of the native teachers: there was also a chief from Feejee.

The two school-rooms, together with the houses of the native teachers, are built within a fence enclosing about 20 acres of ground, which was given for the purpose by King George. It is cultivated as a garden by the teachers residing upon it; and a broad walk, bordered with pine-apple plants and bananas, runs along its whole length, and on each side are the cottages of the teachers, with neatly kept paths leading to them from the main walk.

After attending the examinations, Mr. Thompson, the chaplain of the *Meander*, and myself, went upon an exploring stroll round the

place to see something of the usual occupations of the natives at their homes. One of the things, that strikes a visitor most upon his arrival at Tongatabu, is the incessant hammering which commences at daybreak, and continues without intermission until about noon. To satisfy ourselves as to the cause of this, we entered the first house in which we heard the noise, and found two women engaged in making tappa, or native cloth. They were seated on the ground, one on each side of a log about 6 feet long and 6 inches square, which was raised just clear of the floor by means of short bits of stick placed under the ends of it. Each woman had a piece of the bark, of which the tappa is made, laid before her on the log, and was beating it with a wooden mallet about a foot in length, the handle being rounded, and the striking end square, with grooves in the sides. They wetted the bark from time to time, sprinkling water upon it from a large wooden bowl that stood upon the ground beside them.

In another hut a woman was shaving the head of a young child with a bit of glass broken from the neck of a bottle, dipping her finger into a cocoanut-shell of water and wetting the place as she went on; the little brown head became perfectly smooth and shining under the operation, which was so skilfully performed as not to disturb the child as it lay fast asleep on her arm. They call this operation *fa-fai-ulu*; literally, shave the head: shaving the chin being called *te-lee kava*, razor the beard.

In the next hut two men were busily employed in rigging the model of a canoe, to sell or barter on board the ship; they were very intent upon their work, leading all the ropes correctly, and finishing every part with great care.

In one house we found a native artist, a woman who made designs for patterns on tappa. She was at work, and had several lying by her which she had just finished. In a corner of the hut lay a pile of enormous yams, some of them being upwards of 4 feet in length. This store, together with other provisions, had been collected by the husband against the confinement of his wife, which appeared likely to take place very soon. The man sat watching her, and nursing a fine boy, and seemed quite proud of the attention with which we regarded his wife's performance.

In the course of our exploring excursion we called upon the principal man of the place, who had presided at the school examination in the morning. He was sitting alone in one corner of the matted floor of his house, and welcomed us as we entered, desiring us to be seated beside him. The house was in no way superior to the generality in the place, except in being a little larger and having the court-yard round it more carefully kept; the only piece of furniture in it was a large kava bowl, which hung up in the apartment. In a corner of the court-yard lay,

what at first we took to be a canoe, about 5 feet in length and 18 inches deep; this was the "lali," or great drum of the town, which was beaten to call the people together on important occasions. The old chief, seeing our curiosity excited about it, took up the sticks, two pieces of wood about 18 inches long, and began to beat it most vigorously, smiling all the time and nodding his head as though he were giving us quite a musical treat, becoming so energetic that we were afraid he would bring the whole place to see what the matter was. It was struck on the edge, one side being much worn away from continual beating. Although the sound, when standing near the drum, did not appear to be very loud, it could be heard distinctly for a considerable distance.

From the Governor's we went to the hill above the anchorage, where the Meander's band was coming to play in the afternoon. On the road we were passed by crowds of natives hurrying to the spot. As the band had not yet arrived we went to look at the inside of the church, which is a very perfect specimen of the native style of building; the floor was about 130 feet long by 44 feet wide; the roof being about 35 feet high in the middle, oval shaped and very deep. There were no windows, the light coming in from the openings in the sides, which served as entrances. The roof was placed upon a frame of very large spars, secured where they crossed each other by strong lashings, and supported by posts below. The whole floor was matted and without division of any kind, excepting a low rail before the pulpit. This church was built for the missionaries by King George in a very short time, upwards of a thousand people being employed in its erection.

While I was making a sketch from the hill, a young man came to me, and said he had a fine canoe to sell, and wished very much that I would go home with him to look at it, saying, in English, "Mine is a very good canoe; supposing you want it, I make the sail to-night;" and then, admiringly, as though he were looking at it, "O it is a beautiful canoe." Being rather more anxious about the sketch than his canoe, I did not pay much attention to what he was saying; and he continued to stand at my elbow, apparently watching every touch of the pencil very intently. Imagining that he was interested in the proceeding, I stopped, and held the book up for him to look at; but the canoe was all he was thinking about, and eagerly seizing the opportunity to direct my attention to his hut, among the cocoa-nut trees just below, he came again to the point, saying, persuasively, "Do come to the canoe;" and looking much disappointed when I said I could not then spare the time, he continued, in a resigned tone, "Well, you have the canoe; I make sail to-night," mentioning the sum of five dollars as the price of it. This latter idea put a stop to any further negotiation on the matter as far as I was con-

cerned; and thinking that by a rather decided answer I had got rid of him, I again went on with my sketch.

The natives had begun to assemble on the hill in considerable numbers, coming in troops from all quarters and gathering round the spot where the band was to play. The young women and boys who had been crowding round me to see the sketch, now ran off and joined the rest, all except my canoe friend, who still kept hovering about, watching at a short distance until he should again catch my eye. There was now a fine chance, so he came up quite close, and looking me for a short time full in the face, with a most absurd, half-dejected, half-laughing expression, said, in an abstracted manner, and as if addressing no one in particular, "O, it is a beautiful canoe, mine." These continued interruptions became at last rather annoying, and as canoes could be obtained alongside for an old coat, I endeavoured to explain to my friend that his ideas were far too extravagant. He listened with an air of deferential attention until I had quite done, then said quietly, "You have not seen my canoe;" and warining with his subject, added energetically, "O it is beautiful!" After this, however distant he might be from the spot, he was sure to come and find me out whenever I landed, and haunt me with his "beautiful canoe." Often, when sketching in some retired part, where I hoped that for once I was safe from his persecution, I was sure to see my friend sitting somewhere among the trees, apparently quite unconscious of my presence, until he could quietly glide up and get near me without being perceived; and when close enough to be heard, he would make some observation in praise of his canoe.

Sinbad was never more tormented with the old man on his shoulders than I was with this provoking native and his eternal canoe. At last I was fairly beaten by his passive system, and finding his canoe really a good one, I gave him—not the five dollars exactly—but a whole wardrobe of old clothes, which pleased him quite as well.

In this digression about the canoe I had almost forgotten the band, which arrived in due time, the people all sitting down on the ground in the most orderly manner, and forming a great circle round it, the best places being given to the women. The music-stands having been set up, and all the preparations completed, a duet from Norma, the Old Hundredth, Drum Polka, Irish Quadrilles, and British Grenadiers, followed each other in rapid succession, the principal chiefs expressing their approval at each pause between the pieces by calling out *Mālo, māléeah!*—Well done! sweet! adding, "go on again."

June 21st.—At daylight this morning, two large double canoes, decked over, and having houses upon them, were seen lying at

anchor close to the edge of the reef in-shore of us. They were crowded with natives busily engaged in unloading them, a number of smaller canoes being employed in conveying their cargoes, which consisted of bundles of matting, large baskets of yams and other provisions, gear of various kinds, cooking utensils, &c., across the shallow water on the reef to the landing-place at the beach. Upon inquiring the cause of all this bustle from the natives alongside the ship, they told us that these were the canoes of King George, who had arrived from Haabai during the night; which being confirmed by information obtained from the shore, the *Meander* at eight o'clock fired a Royal salute, and soon after nine Captain Keppel went on shore to pay a visit to his Majesty.

When we landed we heard that the King was engaged in receiving his chiefs at a great kava party, but understanding that our visit would not be considered an intrusion, we walked down to the place of assembly, accompanied by one of the missionaries, who obligingly offered to act as interpreter and to present us.

The place of meeting was a kind of shed, having the ends and back temporarily closed in with matting. Here we found the King seated cross-legged upon the ground, with five of his principal chiefs on each hand, the rest of the chiefs sitting outside the house and forming a great semicircle upon the lawn before it, the bulk of the people being collected in a crowd beyond. All round were great heaps of provisions—roasted pigs, yams, cooked fish, and bundles of the kava root.*

The King is a fine man about forty-five years of age, upwards of 6 feet in height, and powerfully made. His hair was cropped quite close, and he had neither whiskers nor beard. Features well formed, and forehead rather high than wide. His dress consisted of a tappa petticoat, fastened round the waist and reaching down to the feet. Above this he wore a large piece of fine matting, folded many times, so as to make a great bundle round the body, coming as high as the chest, the arms and shoulders being left bare. He wore no ornament of any kind, and held in his hand a green branch, which appeared to be merely for the purpose of keeping the flies off. The large mat is said to be a mark of distinction, and with the petticoat of tappa forms the court dress of Tonga, as no European clothing is allowed to be worn on these occasions.

When we arrived at the house the business was about to commence. We entered the apartment at the side, and took our places upon mats behind the king, who did not appear to notice us until the missionary had spoken to him, when he turned half round,

* Kava is an infusion of the root of a species of pepper (*Piper myrthesticum*), and upon every great occasion kava-drinking forms an important part of the ceremony.

without rising, and shook hands—first with Captain Keppel, and then with the rest of the party. He thanked Captain Keppel for having brought him a letter from the governor of New Zealand, but said that, having been engaged in receiving his chiefs that morning, he had not yet had time to read it, and then, having accepted an invitation to dine on board that day, he turned his face away, and, resuming his former abstracted look, did not speak again.

The ceremonies connected with the kava drinking were now going on. Two chiefs, each carrying bundles of the root, came in and laid them upon the mat before the king, where they left them and retired. The chief, sitting on the king's right hand, then ordered them to be counted, upon which two men came and sat down before them, with their faces towards the king. The ceremony then proceeded in the order which we were informed was usually observed on these occasions, as follows:—The chief demands how many bundles there are, and the men count them, calling out *A-tá-ha! Ua! Tulu!* one, two, three, and so on, touching each bundle as they do so, and counting them over in this way twice, the same form being observed although there might be only two or three bundles. Pigs, yams, and other provisions are also laid before the king and counted in the same manner, the pigs being carved in the royal presence, each being divided into eight parts, which are handed to the chiefs, who bring what they receive, and again lay it before the king, retiring until his spokesman recalls them, when they finally take it away. The pig's liver is laid upon leaves and presented to the king, who generally sends it to some one as a mark of his favour.

Besides the chief on his right, who directs the ceremonies generally, the king was attended by his orator, a venerable looking old chief, who sat two removed from him on his left, and who, after the chiefs had all presented their offerings, made a speech of thanks for the king in return. He spoke rapidly, but distinctly, pausing for a few seconds between each sentence. During his oration, the most perfect silence was observed, every one listening with an appearance of great respect and attention; the chiefs, when he had finished, calling out, *Mālo-mālécāh*—very good, very sweet; the king, all the time, sitting quite silent, and without appearing to notice anything that was going on.

The kava root was now broken up into small portions with a heavy pointed club, about five feet in length, made out of a whale's jaw, the rind and points of the root being carefully removed, and pieces of it handed round to the chiefs, who chewed it into a pulp, which they spat into a piece of plantain leaf, and went with it to a man sitting with a large wooden bowl before him, in the centre of the semicircle, facing the king. When a sufficient quantity had

been collected, the kava-mixer raised the bowl and inclined it slightly over, so that the king might see it, and then replaced it on the ground. Water was then brought to him in cocoa-nut shells by the people behind, when, wiping his hands very carefully upon some crushed bark, he proceeded to knead the kava paste, pressing it against the bottom of the bowl with the palms of his hands, two men at the same time, one sitting on each side, pouring water into it until the whole became thoroughly mixed. He then wiped his hands again, and taking some white fibre, prepared from the inner rind of the Hibiscus bark, sprinkled a quantity of it lightly over the surface of the fluid, so as completely to cover it; and having arranged it with great care, and perfectly even, he tucked it carefully in round the sides of the bowl, so as to enclose and gather up within it all the more solid portions of the kava. At this stage of the proceedings, the interest in his movements seemed to increase, every one watching him with the greatest attention. Some of the oldest chiefs, who up to this time had sat like mummies, now showed symptoms of animation, and turned their heads towards the kava bowl. The expression of the kava-maker became more serious as he seemed to feel all the responsibility of his office, and proceeded with his work like a man conscious that the eyes of Tonga were upon him. Having tucked the bark in perfectly even all round, he grasped the whole mass firmly from below, and raised it slowly up out of the bowl. This was considered the most critical part of the whole proceeding; and his character as a kava-maker would have been lost for ever if he had allowed a drop of the precious liquor to fall outside the rim. The excitement became every moment more intense, and some hundred and fifty chiefs, the principal men of Tonga, watched in breathless silence the dripping mass which hung suspended over the bowl. The greater portion having drained out in this way, the kava-mixer, with a dexterous turn of the wrist, twisted it round, so as to bring it upon the fore part of the left arm, and then, leaning backwards, put forth all his strength to wring out the last drop. His chest heaved, the teeth were firmly set, the muscles of the arms started out and became hard and defined, the brows contracted and shaded the eyes, as he continued to lean back still more, every part of his powerful frame seeming to come into play, and quivering with the exertion; his skin shining with oil, giving to the figure the appearance of an antique bronze. A buzz of approval rose from the chiefs as he threw the bark away from him, and recovered himself with an appearance of great exhaustion.

The kava then underwent a second straining with fresh bark, but without the same attention to effect, when the man, pronouncing a kind of blessing by striking his hands together, stretched out his arm over the bowl, and it was ready for serving out. The chiefs

now rose, one at a time, and went to him with small cups of green banana leaf, which he filled with a dipper made by rolling up some bark lightly into a rounded point. When the cup was filled, the chief who received it turned round, and, advancing to the centre, fronted the king, holding it with both hands about breast high. A man stationed behind the kava-maker then called out "Kava-kua-heeka!" The kava having been lifted up, the king's spokesman proclaimed in the same tone to whom it should be given, frequently using some sobriquet to point out the person intended—as "atu ia kia 'Taaga!"—give it to the singer—give it to the laughter—give it to the dancer, and so on, but all in the most serious manner imaginable. It was then handed to the person indicated, who drank it off and threw the cup away.

After the kava had been all served out, the chiefs that sat outside the house rose and went off without any further ceremony—the people carrying away their portions of pork, yams, &c.; and this being all that was to be seen then, we made our bow and took our departure, leaving the king to discuss state matters with his ministers, who remained sitting with him in the shed as we had found them. We afterwards called upon the queen, but were informed that she was rather unwell after her passage from Haabai; the young prince, George Vuna, however, was sent out to receive us. He was a fine intelligent little fellow, about eight years of age, with large expressive brown eyes, his head being shaved quite smooth, excepting a lock over each temple. Four or five boys of his own age, his attendants and companions, came out with him. Having indulged their curiosity by allowing them to take a good stare at us, one of the party presented the prince with a waistcoat which reached half way down to his ankles; another gave him a large silk handkerchief of a blue-and-white bird's-eye pattern, which was tied round his neck in a sailor's knot. We then left him, highly delighted with his new dress, his half-dozen naked attendants shouting and dancing round him.

From the palace I went with some others to see if we could collect any curiosities among the houses, and while we were squatted down in one of them, bartering for some tappa, the great town-drum began to beat, and immediately afterwards a native came running in to tell us that the remainder of the royal fleet from Vavau and Haabai were coming in, bringing the Tamahá, a person of the highest rank in Tonga. This news quickly brought us to our legs, and we hurried off with the rest.

The day was brilliantly fine, and natives from all quarters were collecting upon the hill, watching the approach of the royal fleet of large double canoes, as it came up before the fresh sea-breeze, the canoes spreading all over the bay, some far off on the distant horizon, others nearer, threading their way between the little

islets round the anchorage. Closer at hand, some of the largest and fastest sailers, their decks thronged with people, were crowding upon one another like yachts in a regatta, their large angular sails at times nearly touching the *Meander's* jib-boom end, as they came sweeping across her bows, ploughing the sea up with their sharp stems, and leaving broad tracks of shining white foam behind. They were ornamented with long swallow-tailed streamers of different colours, the foot or lower part of some of the largest sails being fringed with an edging of small flags placed close together. Many had rows of large white cowries fastened on to their bows, and carried black crescent-shaped ornaments at their mast-heads. One canoe had a large black ball painted on the centre of its sail. They came tearing along right up to the edge of the reef, and, when it seemed as though another instant must take them up high and dry on to the coral, would shoot up in the wind's eye and shorten sail; prolonged shouts from the people in the canoes already anchored greeting every fresh arrival. A fleet of smaller canoes surrounded the *Meander* as she lay broadside on to the shore. Below the hill on the left, shaded by a sombre looking group of casuarinas, was the tomb of Josiah, the last King of Tonga, and near the spot where we stood, two small trees of the same kind, planted by his sons, marked the site of his palace.*

Having seen the last canoe arrive, we walked down the hill to go on board. At the beach all was stir and bustle, small canoes bringing the people on shore from the larger ones, which lay anchored in the deep water at the edge of the reef. Some of the canoes were loaded with enormously fat old women, and were being pushed across the reef by men wading alongside, who helped the old ladies out at the landing-place and set them on their legs with great care, when they waddled up the beach like so many turtle. Wishing to engage one of these canoes to take us off to the ship, we made the men understand that if they would come with us we would pay them for their trouble when they got on board; upon which they ran up after the old ladies to ask their permission, which, however, was most unceremoniously refused. One of the most re-

* *Casuarina equisetifolia*. Pickering, in his 'Races of Men,' mentions this tree as having been introduced into Polynesia; and remarks that it has probably been brought from the westward. My attention was particularly arrested by the use of it at Tongatabu as the emblem of mourning, from having noticed that the natives of Twofold Bay, on the S.-eastern coast of Australia, select spots shaded by it for the interment of their dead. In the only instance where this was not done, I remarked that branches of it were brought from some distance and laid upon the newly-made grave. At Tahiti, the grave of King Pomare (father of the present Queen) stands in a grove of them. It grows generally by the sea-shore, where the wind, passing through its fine hair-like leaves, produces a mournful sighing sound, which, with its sombre tint, adapts it peculiarly to the same purposes as the cypress and trees used in other countries for planting near tombs.

markable things in connexion with the Tonga Islands is the respect and consideration in which the women are held. They have female chiefs; and if a woman of the higher class marry any one beneath her, she still retains her superior rank.

The coral reef at Nu-ku-alófa forms a belt along the shore, varying from 50 to 150 yards in width, deepening suddenly so that a large vessel at low water might lie close alongside it like a wharf. Over this coral flat we had always to walk upon landing, the depth of water upon the crumbling coral varying from ankle to knee-deep, with occasional holes in which one might suddenly find himself up to the neck. After our first visit we always went prepared for any depth.

At 4 o'clock King George, accompanied by the missionaries, Messrs. Lawry, Amos, and Daniells, came off to the ship. His Majesty now wore a clean white shirt, with the usual tappa petticoat fastened round the waist and hanging down to the feet. He was received at the gangway by Captain Keppel and officers with a guard of honour, and was then taken below to the captain's cabin. Here he looked with great attention at the pictures hanging round, particularly at some hunting scenes; and being shown a coloured panoramic sketch which I had made at Cape York, with canoes and Torres Straits natives in the foreground, he looked at it very attentively, inquiring where they belonged to, and asking several other questions about them. In the dining cabin he examined with great interest the engraving of the Queen after Winterhalter. At dinner his manner was composed and dignified: he took soup, and used a knife and fork with perfect ease, taking wine with Captain Keppel and the rest at table, preferring champagne to any other, but drinking very moderately. When asked if he would take some wild-duck (which had been shot at the lagoon in the island), he replied, "No, that is Tonga, I can always get that," and, looking towards a leg of mutton, added, "I will take some sheep." He inquired the rank of the different officers who were at table, and observing a midshipman amongst them, he asked "Why that boy was there?" As he was helping himself when the cheese came round, one of the missionaries interrupted him rather hurriedly, telling him that he thought he would not like it; to which he replied quietly, "If I do not, I can wash it down with water." The most perfect composure of manner marked all his actions, and formed one of the most striking features in his character. At dessert, several glasses, containing different kinds of wine, were placed before him, in order that he might choose which he liked best. Captain Keppel observed at the same time that there were other light French wines if he preferred them, at which he shook his head, and said, with an animated expression in broken English, "I do not like French." Upon his health being drunk, and the

compliment explained to him, he immediately thanked Captain Keppel and his officers. After dinner chairs were taken on deck and the party adjourned to the poop, where the band played a variety of airs, opera pieces, &c., with which his Majesty appeared much pleased, saying at the end of every piece, "Mālo" (very good), adding slowly with a deep bass voice, "Mālēeah" (very sweet). Coffee being served on deck, he laughed at our taking such a variety of things at one meal, but drank two cups which he half filled with sugar. He then made a short speech addressed to Captain Keppel to the purpose "That he was proud a vessel so large, and belonging to so great a nation, should come to see him who was so weak and his people so few. That it made him feel glad to see Captain Keppel and so many officers;" and then, alluding to Tahiti, said, "that he knew of the confusion caused by the French; that he wished not their visits and friendship; that theirs was (unga mātē) a deadly shade, observing, that he did not say this because he was sitting beside one of the Queen of England's great chiefs, and on board her ship, but that, if his departed ancestors could come to speak there that day, they would all bear witness to his truth, and that if every member of his body had a voice they would all say, thank you." He spoke fluently, with pleasing intonation and dignified manner. We were told that the *Meander* was the largest vessel he had ever seen, and he was very particular in his inquiries as to the number of men and guns she carried, and expressed some curiosity to know where and how the men all slept. To explain this, a hammock was taken out of the nettings and slung under the spanker-boom. While this was being done, the men forward happened to be hoisting a bullock out of the boom-boats to be lowered on to the main deck for killing. This caught his attention and seemed to interest him more than anything that had been shown him, and forgetting for a moment his usually dignified manner, he picked up his tappa gown, and ran forward to look at it.

About seven o'clock he took his departure under a royal salute; and at eight, a number of rockets were sent up, all the natives coming down to the beach to look at them, calling out to each other as they watched them ascending, "See! see! how they walk in the sky!"

June 22nd.—Hearing that the king was to give another great kava party to-day, I went with several others to see it. There was, however, nothing new in the ceremony, but on this occasion I succeeded in getting a sketch of his Majesty, who soon perceived what I was about, and when it was finished, desired to see it. The chiefs also were all curious to see it, passing it from one to another, saying as they looked at it, "It is the king." When I asked through one of the missionaries for the royal autograph, the

king said he did not like to write before so many white men, who were all so much wiser, and who knew how to write so much better than himself, but that he would write it for me when alone. After the Assembly broke up we went to the palace, where we had called the day before, and found the queen prepared to receive us. Her Majesty was seated on mats in the centre, or chief place of the apartment; the king sitting on her right, and three principal chiefs on her left hand, the rest of the chiefs all sitting round in a great semicircle on the lawn before the palace, as they had done at the kava party. The queen is about thirty, very stout, with a round good-natured face, large and full eyes, with a very pleasing expression, small mouth and very white regular teeth. She wore her hair short, and dressed with a white powder rubbed on wet, and then combed so as to stand up like the front of a barrister's wig—a mode of hair-dressing by no means unbecoming in the Tongaese women. She received us without rising, smiling and holding out her hand as we were presented. There were present on this occasion a number of Feejee chiefs, who had just arrived with one of their principal men. They had their faces and necks blackened, and wore enormous bushes of hair, dyed different colours and curiously arranged, very much resembling in this respect the natives of the Louisiade. They were smaller and much darker in colour than the Tongaese, with a wild restlessness of expression, quite different from the placid manner of the Friendly Islanders. Upon seeing me the king remembered my wish to have his autograph, and taking my sketching tablet and pencil with him into the royal bed-chamber—a small room divided by a mat-partition from the one in which we sat—he wrote his name, and brought them out to me again. Wishing to have that of the queen, whom I had heard could write, I ventured to ask for hers also. She appeared pleased with the idea, and smiling, at once got up from her mats, and going into the bedroom, as the king had done, returned again immediately, having placed her own signature, "Charlotte Lube," or Charlotte the Dove, below that of her royal master. The king signs "George Tubou," or George the King.

I had tried the day before, without success, to procure one of the musical instruments mentioned by Cook, a kind of flute played with the nose, called a "fung fung," and a native girl had undertaken to find or make one for me to be ready when we came on shore to-day. Hearing that she had kept her promise, and moreover was quite prepared to show me the mode of playing it, I slipped away from the Royal party, and started off with one of the missionaries to go up to his house, that I might see the performance, but as we met her upon the road, bringing three or four of the flutes with her, we turned and walked back. When, how-

ever, we reached the entrance to the Royal enclosure, she hesitated, and would not go in, but continued standing at one of the side-gates, where she could not be seen from the house. After several ineffectual attempts to persuade her to show me how the instrument was played, I gave it up in despair, and returned to the rest of the party, who were seated with the king and queen listening to the band. A short time after I had sat down I thought I saw the matting behind the queen moving as if it were being pushed gently forwards, and my curiosity being awakened, I continued to watch it attentively; it stopped, but in a few minutes there was another movement, and a head was popped in sideways, but instantly withdrawn as I recognised the laughing face of the young lady of the fung fung. I think the queen observed me, for much to my alarm she turned round, and caught sight of the head, which came through again at the same instant, and I was not a little relieved when, instead of showing any displeasure, she spoke in the most good-humoured manner, apparently inviting her to come in, for immediately after, the body followed the head, and the girl seated herself behind the queen. Noon was our time for getting under way, and my chance of hearing the fung fung was becoming less probable every moment. Finding there was no other hope left for it, I requested one of the missionaries to use his influence to see if it could be done. The queen laughed when she heard that I was so anxious about the matter, and even the grave features of his Majesty relaxed into a smile as he seconded my wishes by a Royal command. The girl, rising from her place beside the Queen, came and sat down close in front of me with the fung fung in her hand, while with all the gravity I could muster, I took out my tablets and pencil ready to commence my sketch with the first note, but the moment she put the fung fung up to her nose and began to blow, there was no standing it; my attempts at gravity, by appearing to be very intent upon the sketch, only made the case more desperate, and the girl happening to look at me, it was impossible to contain ourselves any longer, and there was a general burst of laughter—in which no one joined more heartily than the king and queen. The young lady skipped away, nearly overturning one of the missionaries in her hurry to get behind the queen again. She could not be induced to make another attempt in public, but said she would play it in the next apartment where she might be heard without being seen, but here the first few puffs were always followed by her half-suppressed bursts of laughing, in which everybody outside joined, so that after all I got no regular performance on the fung fung. It was now nearly 12 o'clock, and, taking our farewell of their Majesties, we went down to the beach, I, for one, sincerely hoping that the "northing" in the breeze might keep us for a day or two longer.

On board the ship we found the chief of the Feejee party we had seen on shore. He was the brother of Thakuban, the most powerful chief of the Feejee Islands, and was here on a visit to King George, to whom he had brought a number of presents. He had come off in a small canoe, bringing with him, as his interpreter, an old English sailor living at Nu-ku-alófa, and was taken round the ship below, into the stores and through the wings, all of which astonished and delighted him; but what he admired more than all was the marine sentry at the captain's door, and he had a chair placed so that he might sit and look at him; not satisfied with this, he jumped up after a short time, and taking him by the hand, walked gravely backwards and forwards with him, until seeing another, stationed on the main deck forward, he left the former that he might go and walk with him also. He was a noble specimen of a savage, and seemed to be absorbed in two ideas, extreme vanity and a love for everything connected with fighting, and appeared to consider himself vastly superior to King George, or anybody in Tonga. One side of his face was painted brilliant red, the other being left of the natural dark-brown colour, a clear line of division running down the centre of the nose. As a breast ornament he wore a large boar's tusk, suspended by a string of small blue beads; but the most extraordinary part about him was the arrangement of his hair and beard. The front part, all round the face, was dressed in a very peculiar manner, and at a little distance had the appearance of a compact mass of light-grey felt, clipped into a horseshoe shape, and standing up as stiffly as though it had been cut out of wood; the hair at the back of the head being of a different colour, light-brown and frizzled out into an immense even bush, into the middle of which was fastened a great tail of jet-black hair, done up into a number of separate strands, and hanging 3 feet down the back; his large black bushy whiskers being trimmed with the greatest nicety and carried round under the chin, a small black moustache, with pointed ends, just covering the upper lip. In the front of his hair he wore a narrow comb about 15 inches long, which stuck out like a horn. He was presented by Captain Keppel with a sword and belt, and a looking-glass, things which seemed to please him more than anything else that could have been given him. Upon leaving he expressed his regrets to Captain Keppel that he had given away on shore all the shells and other things which he had brought with him from Feejee, and had nothing left to offer him, at the same time drawing out and giving him his comb, and wishing that the *Meander* might pay him a visit at the Feejees. He went on shore standing up in his small canoe and admiring the sword. Soon after the *Meander* got under way and we sailed for Tahiti.

General Remarks.

Kava.—The use of the kava, from its intoxicating property when taken in any quantity, is discountenanced by the missionaries, but the custom seems to prevail nearly as much now as when Cook visited the islands. It is the first thing prepared by a chief when visited by his friends, and to neglect this would be considered a want of courtesy amounting to insult, which would be highly resented. At kava parties the ring is kept clear, no one who is not employed in some duty connected with the ceremony being allowed within it, and to walk across it would be considered as an insult to the whole assembly. The kava is carried by inferior chiefs to those of higher rank, and the king would take it to the Tamahá or Tui Tonga Tagata. When they have drunk the kava they throw away the small cup in which it is served, and at neither of the two great kava meetings we saw was the same cup used twice. It is considered best when chewed by young women. In my strolls round the island I saw several plantations of it; the young shoots had just spread into leaf and were hoed, the ground between them being carefully cleared of weeds.

Human Sacrifices.—The last human sacrifice was offered at Mua about eight years ago, on the occasion of the death of Fátu, the chief of the place, to propitiate the god who they thought had punished them by thus depriving them of their chief. It was a boy, about eleven years of age, who was strangled with a piece of tappa passed round his neck, and then drawn tightly by two men, one of whom was his own father!

Finger Sacrifices.—Many of the natives have lost their little fingers. These were formerly cut off by the parents of the children as offerings to the gods, to obtain success in war, or to propitiate them in cases of sickness.

Disease in Children.—The children when first born, and for some time after, are very healthy, but invariably about a certain age break out into sores which spread all over the body. I have observed the same thing at Cape York, and some of the islands of Torres Straits, where the natives call it Badállí, and attribute it to the influence of the Mydállaga, or men who deal in charms, or to the ill wish of some secret enemy.

The Tabu.—Whatever might have been the mysterious nature and origin of the tabu, it simply means now something forbidden. A tent being set up near the beach for the purpose of affording shelter to the men who were sent ashore to burn lime, and to contain their clothes, provisions, and cooking utensils, the natural curiosity of the natives made them rather troublesome, which being observed by an old chief, he called them all out and placed the

tent under tabu, but this restriction, although observed while he was in sight, had evidently no great weight with them, for when he was gone they came crowding in as before.

Friendly Disposition of the Natives.—The friendly disposition of the Tonga Islanders is worthy of remark. Immediately upon our arrival, nearly every one who went on shore had his particular friend. I was adopted by a chief named Julius, who exchanged names with me, and was very particular in making me understand that I must apply to him for anything I might require, and regularly came down to meet me when I landed, always wishing that I should go and dine with him. They showed great attention in this respect to all the officers who went on shore, taking them to their houses when they came back from shooting, laying out before them boiled fowls, yams, cocoa-nuts, and bananas, and frequently, when a whole party had dined in this way at one place, some other natives would come who had also prepared a dinner for them, and be greatly disappointed upon finding that they had been already entertained, trying to tempt them to eat more by bringing what they had prepared and spreading it out before them.

King George's Flag.—At the time of our visit the Tongaese had no distinguishing flag, the chiefs ornamenting their canoes with long streamers made with pieces of coloured cotton arranged according to fancy, and it was suggested to the king that he should have a national flag. Since this, he has been to the missionaries and requested that they would prepare one for him, which I hear they have done, and it is described as follows:—"It has occurred to us, that a fit emblem of the past history of Tonga might be a club and a bow and arrows, showing the warlike character of the people. For its present Christian state we select the emblem of a dove with an olive branch, and for the natural state of Tonga, and the bounty of Divine Providence, we fix upon the cocoa-nut tree, as affording so many and various articles for meat and drink and building and furniture."

Proposed Trade between Tongatabu and New Zealand.—There has been some attempt to establish a trade in cocoa-nut oil between these islands and New Zealand. It was proposed that King George should collect sufficient cocoa-nut oil to freight a small schooner, which was to be sent from New Zealand when the cargo should be ready for it. The oil was then to be sold, and the vessel purchased for the king with the proceeds. This plan does not seem to have been met very warmly by the king, who, I believe, once had a vessel of this description, but having lost her, he has given up the idea of trading, saying that he is tired of trying to get rich, remarking that if one of his large canoes is lost he can easily get another from the Feejees; that he wants nothing among his

own people, and finds sufficient employment in attending to his duties as King without meddling in trade. He is one of the best sailors among the Tonganese, and has frequently shown remarkable coolness and presence of mind in situations of danger. When we were at Tongatabu he was about to build a jetty over the reef at the anchorage. He does not smoke, and his example is generally followed by his people, smoking being considered as a mark of dissipation. At one time, however, it prevailed to a great extent, nearly every man and woman, and even many children, smoking whenever they could get tobacco. The use of it is discouraged by the missionaries, but I imagine that some of the natives still secretly indulge in it, for while I was sketching one day a young woman came up to me, and, first looking cautiously around, inquired in a confidential whisper if I had any tobacco, at the same time showing me a short black pipe.

Canoes.—The model exhibited will serve to show the construction of these better than any description. They are steered with a large paddle on the lee quarter, and it will be seen that the lower part or foot of the sail is secured to a spar in the same manner as the sails of the "America" yacht. King George's canoe is 90 feet long, the sail being 90 feet high and 60 feet wide at the top. These large double canoes will carry as many as 200 men.

In 1847 King George, fearing that the French might interfere with him, wrote a letter to the governor of New Zealand, requesting that he might with his people be received as subjects of the British crown.

I would venture to remark that it must be of advantage to cultivate friendly relations with the inhabitants of all such islands as are desirous of being connected with us, more especially as it may be very desirable to form depôts for our steamers at some of the islands. It has been exceedingly difficult for me to draw a line between the geographical and the ethnological in this paper, as they are so intimately connected; but I trust by this simple narration, illustrated by the pencil, that many, who would have no taste for a voyage of 12,000 or 15,000 miles, will in some measure realize the condition of our antipodean fellow men; and it is to be hoped that in a comparatively few years the connexion existing between our Australian colonies and the mother country may also include these beautiful and fertile islands.

Sailing Directions for entering Tongatabu.

HAVING no map of Tongatabu, or any knowledge of the place, we were in doubt as to which was the proper entrance to the anchorage, and the following sailing directions were afterwards kindly given me by Mr. May, master of the *Meander*, as the result of his observation upon going in.

When the northern point of Eua bears S., steer direct for the small island of Eua Eki, on nearing which several small islets will be observed immediately to the

northward and westward of it, and the eastern point of Tongatabu will then be clearly seen, and cannot be mistaken. Abreast of Eua Eki we picked up a native pilot, and bore up for the opening between that island and the E. point of Tongatabu, which is the entrance to the anchorage on the northern side of the island.

No stranger should attempt this passage without a pilot; and at first sight it appears almost impossible to take a ship through the different windings between the coral reefs.

In running up you have the shore of Tongatabu on the left hand, and a number of small wooded islets on the right; all the shores being edged with coral reefs, which are generally breaking, and for the most part dry at low water. About halfway through the channel there is an awkward turn, with two sunken rocks in the centre, contracting the channel to less than a cable's length, steep until you pass to the westward of these rocks. With the exception of this turn, the channel is of good width, and within the passage it spreads out into an apparently clear, broad sheet of water, edged on the outside by small islets.

The Meander ran in and anchored within 400 yards of the edge of the flat reef which runs off the shore, just abreast of the church, in 17 fathoms water; sandy bottom. There are no high leading marks for the passage; but from the bowsprit-end or fore-yard all the dangers may be seen. With the danger from sunken rocks, no ship could work through the turns; and the passage should never be attempted without a commanding fair wind, the tide setting in different directions over and between the coral reefs.

VII.—*Notes on the Distribution of Animals available as Food in the Arctic Regions.* By AUGUSTUS PETERMANN, Esq., F.R.G.S., &c.

Read Feb. 2, 1852.

THE occurrence of animals in the Arctic Regions, and its bearing on the missing expedition under Sir John Franklin, is a subject which has of late excited a good deal of interest, and has given rise to the most conflicting and contradictory opinions: some maintaining the existence of animals in the Arctic regions in great numbers, affording abundance of food to man; others as stoutly insisting upon the extreme scarcity, if not total absence, of them.

On entering, however, into an analysis of all that has been said and written on this point, it appears that a too confined view has been generally taken of the subject. Individual observations in certain localities have been separately considered and reasoned upon for the entire region, and these localities only related to a comparatively small space on the American side, the whole Asiatic side of the Polar basin not being taken into account at all. Again, it has been commonly assumed that with ascending latitudes temperature descended, and animal and vegetable life decreased, attaining their minima at the Pole. Nothing could be more fallacious than such an hypothesis in a region where the temperature corresponds less with latitude than in any other part of the globe. When, therefore, the shores and waters of Wellington Channel were found to be "teeming with animal life," it was regarded as a wonderful fact that more animals should be found in that region than in those to

the south of it; whereas this fact would seem to find an explanation when connected with other physical features. Indeed, the consideration of isolated facts alone can lead to no correct result; and it is only when the various natural features are compared and considered in their relative bearing, that the laws which govern nature can be traced and discovered. It is in this manner only that Physical Geography becomes a really useful and practical science.

In the following outline it is attempted to take a comprehensive, though rapid, glance of the distribution of animals within the Arctic regions generally, and to inquire into the causes of certain apparent abnormalities.

I will, in the first place, proceed to indicate the regions to which these remarks refer; those, namely, which comprise the Arctic fauna. On this point I have adopted narrower limits than other authors, inasmuch as I have taken the northern limit of woods as the southern boundary of the region under consideration. It is true that some Arctic animals, like the reindeer, are found to the S. of this line—still these are not exclusively Arctic in their character, and they are also, more or less, of migratory habits. The ice-fox, a beautiful little animal, well known to Arctic voyagers, and decidedly of Arctic character, does not in general extend to the S. of the line assumed;* which also coincides with the extreme northern limit of the reptiles, and corresponds pretty closely with the line of 50°, mean summer temperature. The region thus comprises Iceland, Spitzbergen, Novaia Zemlia, the extreme northern shores of Europe and Asia, with the north-eastern extremity of the latter, including also the sea of Kamchatka and the Aleutian Islands, but excluding the peninsula of Kamchatka. On the American side it comprises a considerable portion of British North America, the northern part of Labrador, and the whole of Greenland.

Though several classes of the animal creation—as, for example, the reptiles—are entirely wanting in this region, those of the mammals, birds, and fishes, at least bear comparison, both as to number and size, with those of the tropics,†—the lion, the

* The only exception, I believe, where the Arctic fox ranges southward within the wooded district occurs in North America round Hudson Bay. This is owing to its habit of keeping as much as possible on the coast in migrating to the S.; thus, while they extend along the shore of Hudson Bay to about 56° N. lat., towards the centre of the continent they are very scarce even in lat. 61°, and in lat. 65° they are only seen in winter, and then not in numbers.—(See Richardson, *Fauna Boreali-Americana*, p. 87.) Throughout the whole of the Asiatic and European north the range of the ice-fox is nowhere found to be within the wooded region, as Haer has shown in his masterly account of the distribution of this animal.—(See *Bullet. Scientif. publié par l'Acad. Imp. de St. Pétersbourg*, tom. ix. p. 89.)

† Though the number of species is decidedly inferior, the immense multitudes of individuals compensate for this deficiency. Some years ago I wrote with

elephant, the hippopotamus, and others, being not more notable in the latter respect than the polar bear, the musk ox, the walrus, and, above all, the whale. Besides these, there are the moose, the reindeer, the wolf, the polar hare, the seal, and various smaller quadrupeds. The birds consist chiefly of an immense number of aquatic species. Of fishes, the salmon, salmon-trout, and herring are the principal, the latter especially occurring in such myriads as to surpass everything of the kind met with in tropical countries. Nearly all these animals furnish wholesome food for man. They are, with few exceptions, distributed over the entire region. The number in which they occur is very different in different parts. Thus, on the American side we find the animals increase in number from E. to W.—on the shores of Davis Strait, Baffin Bay, Lancaster Sound, Regent Inlet, fewer are met with than in Boothia Felix and the Parry Group. The abundance of animal life in Melville Island and Victoria Channel is probably not surpassed in any other part of the American side. Proceeding westward to the Russian possessions, we find considerable numbers of animals all round and within the sea of Kamtebatka, as also to the N. of Behring Strait. The yearly produce of the Russian Fur Company in America is immense, and formerly it was much greater. Pribylow, when discovering the islands named after him, collected within two years 2000 skins of sea otters, 40,000 sea bears (Ursine seals), 6000 dark ice foxes, and 1000 pool of walrus teeth. Lütke, in his voyage round the world, mentions that, in the year 1803, 800,000 skins of the Ursine seal alone were accumulated in Unalaska, one of the depôts of the Russian Fur Company; 700,000 of these skins

regard to this point—"If we were to conclude from a large number of species that there must be a large number of individuals, we should come to erroneous conclusions, for such is frequently not the case. The Arctic and tropical countries furnish an excellent example, at least in their Mammalian and Ornithological Faunas. We need only refer to the crowds of birds which hover over the islands and shores of the north, or to the inconceivable myriads of penguins met with by Ross on the Antarctic lands, where there was not even the smallest appearance of vegetation; and, among the quadrupeds, to the thousands of fur animals that are annually killed in the Arctic regions. Wrangell gives a fine description of animal life in the Kolyma district of Siberia, one of the coldest regions of the globe: the poverty of vegetation is strongly contrasted with the rich abundance of animals; countless herds of reindeer, elks, black bears, foxes, hables, and grey squirrels, fill the upland forests; stone foxes and wolves roam over the low grounds. Enormous flocks of swans, geese, and ducks, arrive in spring, and seek deserts, where they may moult and build their nests in safety. Eagles, owls, and gulls pursue their prey along the sea-coast; ptarmigans in troops among the bushes, and little snipes are busy along the brooks and in the morasses. Haer also relates that a walrus hunter on the rocks of *Norvut Zemlin* caught in a few hours 30,000 lemmings. On the other hand, in Australia, and other regions of the tropical and temperate zones, a traveller will frequently journey for weeks together, and pass over hundreds of miles of country, without meeting with a single quadruped."—See *Atlas of Physical Geography*, by Petermann and Milner, p. 130.

were thrown into the sea, partly because they were badly prepared, partly in order to keep up the prices. In the Polar Sea to the N. of Behring Strait, as is well known, the number of whales found is prodigious; during the last three years American whalers, at the rate of 150 every year, having been employed in that small portion of the ocean. But in no other part of the Arctic zoological region is animal life so abundant as in the north-eastern portion of Siberia, especially between the rivers Kolyma and Lena. A description of the Kolyma district has already been given in the preceding remarks, to which the following particulars may now be added. The first animals that make their appearance after the dreary winter are large flights of swans, geese, ducks, and snipes: these are killed by old and young; fish also begin to be taken in nets and baskets placed under the ice. In June, however, when the rivers open, the fish pour in in immense numbers. At the beginning of the present century several thousand geese were sometimes killed in one day at the mouth of the Kolyma; about twenty years later, when Admiral Wrangell visited that place, the numbers had somewhat decreased, and it was then called a good season when 1000 geese, 5000 ducks, and 200 swans were killed. Reindeer hunting forms the next occupation of the inhabitants. About the same time the shoals of herrings begin to ascend the rivers, and the multitudes of these fish are often such, that in three or four days 40,000 may be taken with a single net. On the banks of the river Indigirka the number of swans and geese resorting there in the moulting season is said to be much greater even than on the Kolyma. West of the Lena, and along the whole of the Siberian shores as far as Novaya Zemlia, and including that island, animal life presents a great contrast to the preceding portion, as it is nowhere found in such abundance as in the districts already described, and in many parts it is extremely scarce. Spitzbergen, although possessing considerable numbers of animals, especially reindeer of the best description, is greatly inferior to north-eastern Siberia in that respect.

Having now completed this circumpolar view of the distribution of animals, its causes remain to be considered.

The development of vegetable and animal life in the Arctic regions chiefly depends on the warmth of two or three, or even one summer month; and it may be in general assumed that where the summer warmth is the highest, there plants and animals will be found in greater number and bulk than in other regions where the temperature is lower. This assumption is found to be correct as far as actual observations have been extended. The distribution of temperature in the Arctic regions and its causes I have elsewhere* discussed; in this place the summer temperature

* See Petermann's 'Search for Franklin,' 1852.

only requires to be considered. To afford, however, the elements of a complete view of the distribution of temperature within the frigid zone, I have collected the observations made at various points, including some interesting stations not strictly belonging to the Arctic regions: these results are given in the Table (pp. 126, 127), and enumerated with respect to latitude.

According to Sir John Richardson, terrestrial animals are abundant in the polar regions for two short summer months only. Birds fly to the N. to perform the functions of incubation and rearing their young, which done, old and young, with the exception of some scattered flocks of dovekies, desert their breeding-places, and, with the frost, wing their way southwards. Reindeer, musk-oxen, and the beasts of prey which follow in their train, do not quit the continent to visit the Polar islands until the thaw has made some progress in thinning the snowy covering of the pastures, and they return towards the woodlands again as soon as the sea is fast, or sooner, if the straits which separate their summer haunts from the main are narrow enough for them to swim across. The temperature of the month of July, which corresponds with the summit of the summer, appears to be a pretty sure index of the occurrence or abundance of animals in those regions. The following table exhibits the places of the lowest mean July temperature of the American half of the Arctic regions, being all below 40°:—

Winter Islands	(latitude 66 11)	. . . . .	35·4
Port Bowen	(,, 73 14)	. . . . .	36·6
Assistance Harbour	(,, 74 40)	. . . . .	37·8
Igloodik	(,, 69 21)	. . . . .	39·1

Observations made on board of vessels navigating Baffin Bay and Hudson Strait give the following additional results:—*

	Mean Latitude.	Mean Longitude.	Mean Temperature of July.
	° /	° /	°
Baffin Bay	70 0	59 0	33·5
Baffin Bay	70 0	58 0	34·8
Baffin Bay	75 5	59 4	34·9
Hudson Strait	63 0	77 0	35·3

An elliptical curve drawn round the foregoing points, having as its axis a line extending from the entrance to Hudson Strait to Assistance Bay, and including Davis Strait, Baffin Bay, Lancaster Sound, Barrow Strait, Prince Regent Inlet, Boothia Gulf, Fox Channel, with the land between, comprises the coldest

* As given by Dr. Sutherland in his 'Journal of a Voyage to Baffin's Bay and Barrow Strait.' See Appendix, p. clxxvi.

regions on the American side. This region is precisely that in which the fewest numbers of animals have been met with. Beyond it, even to the N., where the July temperature—as in Melville Island—has been found to increase, there the animals also have been found in greater numbers. Dr. Sutherland, in his valuable work already quoted, gives some interesting remarks on this head. He says,* “That deer are more abundant on the N. side of Cornwallis Island, adjacent to Barrow Strait, no person need doubt; for Captain Penny’s and Mr. Goodsir’s travelling reports contain frequent allusions to the numbers of these animals that were seen there; while not one, so far as I know, was ever seen during the whole year in any of the frequent excursions made from the ships in Assistance Bay.” Again: “It will be rather peculiar if we find that these animals take towards the N. side of Cornwallis Island as the winter approaches, that they may share the modifying effect which the open water in Queen’s Channel must have upon the atmosphere in its vicinity; and it will appear at variance with the generally received opinion that these animals migrate southward on the approach of winter.” It would have been interesting if a series of observations of the temperature in the regions referred to by Dr. Sutherland could have been made, so as to draw a comparison in that respect with Assistance Bay.

In Wolstenholme Sound, at the head of Baffin Bay, though having a July temperature of $40^{\circ} 5'$, a comparatively small number of animals were observed by the expedition of the ‘North Star.’ This is a point, however, from which animals can easily migrate to the S. or N.; and if the temperature be higher farther N. during the summer, as is highly probable, they unquestionably would extend their migrations in that direction. Dr. Sutherland has an interesting remark bearing on the point:—

“The Esquimaux lad whom Captain Oummaney took on board H.M.S. ‘Assistance,’ at Cape York, says that the Esquimaux who inhabit the coast in the vicinity of Whale Sound, at the top of Baffin Bay, clothe themselves with the skin of the musk-ox (umingmak). This statement, if true, would lead one to the idea that the musk-ox inhabits still more northern regions than Melville Island—regions whence they cannot return into a more southern latitude with the close of the season, owing to the open water in the top of Baffin Bay throughout the whole winter. And moreover, it may lead to the inference that such regions as can maintain the musk-ox throughout the year in so high a latitude as 77° and upwards must present features with respect to temperature which are peculiar only to regions in the vicinity of an extensive sea.”

On the Asiatic half of the Arctic regions the July temperature stands as follows:—

* ‘Journal of a Voyage to Baffin’s Bay and Barrow Strait,’ Introduction, p. xxxii.

Spitzbergen, N. W. extremity	(latitude 80° 00')	. . . . .	36° 0
Novaya Zemlia, Katische Pforte	" 70 37)	. . . . .	36° 3
Ditto, Seiche Bay	" 74 00)	. . . . .	37° 7
Ditto, Matochkin Shar	" 78 00)	. . . . .	40° 0
Spitzbergen, Hecla Cove	" 79 55)	. . . . .	40° 2
Kovennoy Filipovskoy	" 71 05)	. . . . .	48° 6
Ust Yansk	" 70 58)	. . . . .	58° 6
Nishnei Kolymsk	" 68 32)	. . . . .	61° 0

In this region the influence of the temperature is still more striking, as it has been shown that north-eastern Siberia, comprising the warmest stations in the foregoing list, exhibits not only the greatest amount of animal life in northern Siberia, but throughout the whole of the Arctic regions, although in winter it is the coldest on the face of the globe. It will be seen, by comparing the two tables of the July temperature, that Winter Island is the coldest of all stations; and this is likewise the case with the mean of the three summer months. This place is consequently the Pole of cold of the northern hemisphere during the summer; and Mr. Berthold Seemann, the naturalist of H.M.S. 'Herald,' informs me that it is likewise the phytological North Pole, namely, that point which possesses the smallest number of genera and species of plants, and whence the number increases in every direction. While thus in Winter Island the most scanty vegetation is found, in north-eastern Siberia, in a corresponding latitude, noble forests are known to thrive in considerable extent. It is curious to remember that already that distinguished navigator Frobisher, nearly three hundred years ago, in describing the country round the Strait named after him, says that under a latitude of 62° it was colder there than in Wardöhuus in Europe in latitude $70\frac{1}{2}^{\circ}$, the former being comprised in the district I have shown to be the coldest in summer in the Arctic regions as far as our present knowledge extends. It is much to be regretted that the efforts of the numerous Arctic expeditions in this century—in the hope to effect the so-called "North-western" passage—should have been almost exclusively directed and accumulated upon that region,—the most desolate, and, perhaps, the most uninteresting, as well as the most difficult and dangerous portion of the Frigid Zone.

Without going further into detail, I will merely add a few words as to the bearing of the foregoing observations on Sir John Franklin's Expedition.

The general opinion is that the missing vessels have been arrested somewhere between Wellington Channel and Behring Strait and the Siberian shores. Most probably their position is nearer to the latter than to the former points. As these three regions abound in animal life, we may fairly conclude that the intervening portion partakes of the same character, and moreover,

that the further Sir John Franklin may have got away from Wellington Channel, and the nearer he may have approached the north-eastern portion of Asia, the more he will have found the animals to increase in number. The direction of the isothermal lines corroborates this assumption, as they are indicative of a higher summer temperature in that region than in any other within the Polar basin. Those countries being probably uninhabited by man, the animals there would have continued unthinned by the wholesale massacres by which myriads are destroyed for the sake only of their skins or teeth.

An interesting fact was mentioned in this Society by Lieut. Osborn, namely, that Captain Perry, in September, 1850, had seen enormous numbers of whales running southwards from under the ice in Wellington Channel. We know this to be also the case in the Spitzbergen Sea every spring, and that these animals are numerous along the Siberian coasts. This not only tends to prove the existence of one, or perhaps two, Polar Seas, more or less open throughout the year, but also that these seas abound in animal life, as to satisfy enormous numbers of whales a large amount of food is required. And it is well known among the Tchuktschi, on the north-eastern coasts of Siberia,—where land to the N. is said to exist in contiguity and probably connected with the lands discovered by Captain Kellett,—that herds of reindeer migrate between those lands and the continents.

Taking all these facts into consideration, the conclusion seems to be a reasonable one, that Franklin, ever since entering Wellington Channel, has found himself in that portion of the Arctic regions where animals probably exist in greater plenty than in any other. Under these circumstances alone his party could exist as well as other inhabitants of the Polar regions; but we must not forget that, in addition to the natural resources, they would in their vessels possess more comfortable and substantial houses than any of the native inhabitants.

So far as food is concerned, reasonable hope therefore may be entertained that the missing Expedition would not altogether suffer by the want of it;—their fate, however, depends upon other circumstances as well, among which, that dire scourge of mariners, the scurvy, is probably more to be feared than any other.

My authorities have been the works of the various expeditions undertaken in the Arctic regions by the English, Russian, Dutch, and other nations; the zoological accounts of Richardson, Baer, Wrangell, and others; also the valuable papers on the distribution of mammals by Dr. Wagner. The meteorological data are chiefly derived from Dove's tables, and the works of Richardson, Sutherland, Middendorf, and others.

TABLE.

THERMOMETRICAL OBSERVATIONS in the ARCTIC

		Lat. N.	Long. W.	Elev.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.
Lat. 80° to 75°.		°	'	Feet.								
1	Spitzbergen . . .	80 0	10 0	..	..	..	..	..	..	33.71	35.99	33.30
2	Hecla Cove . . .	79 53	16 49	..	..	..	..	..	..	35.86	40.17	39.40
3	Greenland Sea . .	78 0	..	..	..	..	..	14.23	22.32	31.37	37.00	..
4	Waldenholms Sound	76 39	30 0	..	25.07	31.02	17.47	3.74	25.83	30.73	40.52	33.67
Lat. 75° to 70°.												
5	Melville Island . .	74 47	110 42	..	31.28	32.43	18.19	8.21	16.82	30.21	42.45	32.59
6	Assurance Bay . .	74 40	94 16	..	30.7	29.8	24.4	3.7	12.1	34.3	37.9	35.64
7	Narsarsua (Seights Bay).	74 0	58 0	..	9.32	10.29	10.24	10.59	24.30	34.41	37.67	37.72
8	Port Bowen . . .	73 14	88 56	..	23.91	27.31	29.38	6.59	17.57	36.12	36.53	30.54
9	Narsarsua (Maitokin Shur).	73 0	57 20	..	4.28	7.74	4.46	8.29	19.74	34.37	37.97	40.03
10	North Cape, Island of Magdalen.	71 10	26 1	..	27.08	29.16	24.73	30.02	34.07	40.13	46.60	43.70
11	Korsnæs Filippowik	71 3	118 0	..	..	..	..	4.1	16.0	35.1	44.4	51.5
12	Umanak . . .	70 59	138 34	..	39.48	31.18	4.03	6.74	27.95	47.53	58.60	44.62
13	Narsarsua, Karsisken Fjorde.	70 37	57 47	..	2.98	0.09	10.68	3.13	17.51	32.93	36.30	37.51
Lat. 70° to 65°.												
14	North Felix . . .	69 59	92 1	..	24.09	32.02	28.08	2.39	19.05	34.16	41.26	38.69
15	Ighook . . .	69 21	81 53	..	16.13	10.58	19.01	0.93	25.14	32.16	37.09	33.68
16	Narsarsua Karsisken Sound	68 32	160 56	..	34.57	23.59	6.79	15.51	43.98	50.7	61.72	..
17	Port Confidence . .	68 0	163 0	..	..	..	..	..	..	..	62.30	43.7
18	Port Confidence . .	66 54	114 49	500	21.37	21.82	20.91	4.71	..	..	..	..
19	Port Hope . . .	66 32	88 56	..	29.32	28.69	28.10	3.61	17.88	31.38	41.40	46.32
20	Hyak . . .	66 30	20 30	..	25.70	18.50	20.66	27.50	38.14	43.32	49.94	46.04
21	Winter Island . . .	66 11	83 11	..	23.17	23.99	10.73	6.48	23.29	21.17	35.30	36.86
22	Yukon . . .	66 0	147 0	500	26.85	26.34	11.30	12.06	41.24	53.49	64.73	59.30
23	Port Franklin . . .	65 13	123 13	549	23.33	16.75	5.38	12.35	35.18	48.02	52.10	50.56
Lat. 65° to 60°.												
24	Arctur . . .	64 32	40 31	..	6.37	9.23	21.90	31.39	41.68	55.18	60.82	57.58
25	Port Enterprise . .	64 29	113 06	850	15.57	23.83	13.48	5.79	31.28	..	..	..
26	North . . .	64 10	52 34	..	12.38	12.66	15.68	22.01	32.16	38.00	44.92	43.84
27	New Hermit . . .	64 10	52 40	..	9.65	22.10	21.63	24.80	32.7	40.10	46.23	37.40
28	Bay . . .	64 8	21 55	..	22.82	24.31	29.86	36.46	44.80	51.58	53.10	52.06
29	Port Reliance . . .	62 46	109 0	650	25.80	18.84	5.14	8.23	36.03	..	..	..
30	Yakutsk . . .	62 1	129 44	..	45.47	29.86	6.43	16.06	35.91	58.28	68.79	58.10
31	Port Simpson . . .	61 51	121 31	400	13.34	9.06	3.55	26.28	48.16	63.04	63.37	53.84
32	Pelly Alaska . . .	61 33	130 0	1400	21.95	14.73	0.99	20.44	..	..	..	..
33	Port Resolution . .	61 10	113 51	500	0.42	25.60	0.85	13.88	40.14	..	..	..
34	Ichikawa . . .	60 33	46	..	19.74	23.7	27.63	32.43	39.27	43.09	43.37	41.09
Lat. 60° to 55°.												
35	Friedrichshafen . .	60	45	..	19.42	18.73	22.10	27.50	..	..	..	..
36	Petersburg . . .	59 56	30 18	..	14.74	18.69	22.50	37.14	48.32	59.93	63.04	61.16
37	Port Churchill . . .	59 02	30 10	50	11.31	7.31	4.61	16.29	28.42	44.69	56.80	53.30
38	Port Chapsoway . .	58 43	118 20	700	3.76	4.01	3.08	17.90	45.40	65.00	63.00	58.10
39	Hudson . . .	58 0	64 0	..	5.21	5.31	4.62	16.53	33.01	38.61	43.37	42.10
40	Black . . .	57 36	66 0	..	5.15	1.93	3.25	20.0	36.25	44.65	51.63	52.0
41	Sink . . .	57 10	61 50	..	0.95	3.51	7.32	29.97	36.23	42.30	50.19	50.90
42	Sink . . .	57 3	135 18	..	34.18	33.60	38.01	40.64	49.19	51.83	57.11	57.79
43	York Factory . . .	57 0	92 20	90	5.12	0.60	4.77	19.21	30.53	47.67	59.99	51.85
Lat. 55° to 45°.												
44	Oxford House . . .	54 55	98 29	400	22.08	1.90	8.57	28.62	38.61	..	..	..
45	Cumberland House .	54 57	102 17	..	13.2	1.1	12.1	33.4	59.7	58.8	61.8	56.2
46	Halak . . .	54 58	109 33	..	34.27	32.47	31.32	34.16	39.25	44.98	49.33	54.82
47	Reupert House . . .	51 21	83 40	20.1	4.09	0.69	7.64	21.65	41.51	..	..	..
48	St. John's . . .	47 34	52 28	..	23.84	20.89	24.18	33.40	39.30	48.02	56.16	57.86
	London (for comparison).	51 38	0 5	..	37.2	40.1	42.5	48.9	53.5	58.7	62.4	62.1

The longitudes are East when - is prefixed, and West when there is no sign. — * Difference of the hottest Land. — N., northern, Journal of a Voyage to Baffin's Bay and Barrow Straits. — M., Middendorf, Reise von den Döve (11th and 16th Reports British Association, 1874 & 80). — S by interpolation. — † From

TABLE

Regions, arranged according to Latitude.

Sept.	Oct.	Nov.	Dec.	Winter.	Spring.	Sum.	Aut.	Year.	Differ. H. & C. Month.	Differ. S. & W. †	No. of Yrs.	Hour of Observation.	Antennae
..	..	..	..	..	..	34-52	..	..	..	..	1	2-hourly.	R.
..	..	..	..	..	..	38-15	..	..	..	..	3	hourly.	R.
20-76	11-22	15-60	27-00	28-50	1-50	37-97	6-35	4-54	74-51	60-50	1	d. extr. 6 times.	R.
22-69	2-23	21-14	21-02	28-45	3-19	37-68	0-48	1-54	73-90	65-30	1	2-hourly.	R.
21-3	1-5	6-7	21-4	26-73	4-50	35-90	0-37	2-5	67-6	63-00	1	2-hourly.	R.
21-01	23-79	9-63	9-72	9-78	15-12	35-60	21-48	20-74	29-40	26-32	1	2-hourly.	R.
23-63	10-21	0-00	10-03	25-09	3-77	34-40	10-58	3-33	63-46	59-49	1	2-hourly.	R.
31-09	22-26	8-73	3-42	2-22	10-42	36-42	20-69	16-93	49-67	46-78	1	2-hourly.	R.
37-60	32	23-77	25-74	23-66	29-61	43-49	31-79	32-14	24-52	19-37	1	..	R.
29-8	19-04	..	..	..	..	44-0	..	..	..	..	1	8, 12, 4, 12.	R.
19-25	12-58	23-24	37-00	36-90	10-22	50-26	6-32	4-01	34-68	56-16	1	2-hourly.	R.
30-02	20-28	8-24	12-42	5-21	3-22	35-99	17-85	14-99	43-19	32-39	1	2-hourly.	R.
25-41	9-07	6-41	29-43	27-71	3-21	38-04	9-69	0-70	73-29	63-75	2	hourly.	R.
25-69	12-72	19-63	26-23	31-32	1-76	35-04	6-72	6-55	67-34	56-36	1	2-hourly.	R.
30-97	0-30	16-71	21-00	23-22	17-20	..	1-92	..	92-14	..	2	daily, extr.	R.
34-04	10-43	3-68	28-69	27-26	..	..	..	..	..	..	1	15 to 17 times.	R.
29-57	12-26	0-69	19-27	25-69	4-73	29-59	15-93	5-96	73-64	64-68	1	6 times.	R.
42-16	34-34	25-59	18-32	20-81	28-10	43-80	34-46	32-30	23-62	24-96	2	2-hourly.	R.
31-61	13-23	7-69	14-24	20-47	6-25	31-80	17-58	8-49	60-65	52-27	1	2-hourly.	R.
28-66	21-60	8-28	12-42	23-29	56-73	14-60	17-37	14-59	20-60	80-63	1	d. k.	R.
41-09	22-47	0-11	10-38	17-00	50-41	12-60	21-15	17-75	54-43	67-41	2	6 times.	R.
47-62	35-23	29-62	12-61	9-43	31-66	37-25	25-13	23-53	54-78	49-42	18	7, 2, 9.	R.
33-29	21-75	1-70	30-34	34-00	55-7	23-50	17-31	17-91	786-89	79-7	3	10, 10.	R.
33-65	20-84	21-93	17-49	14-14	23-26	40-62	22-14	20-19	29-54	26-46	254	..	R.
34-86	22-90	15-20	11-73	14-20	26-15	32-38	26-50	36-63	31-23	24-68	14	d. extr.	R.
46-45	36-01	36-45	29-41	29-18	37-04	63-54	37-04	39-43	27-88	24-56	14	15 times.	R.
..	20-70	12-44	17-07	16-97	12-51	12-51	..	16-7	114-26	98-09	3	3 times.	R.
45-11	18-50	22-41	34-78	36-37	15-61	61-72	12-76	13-43	76-18	69-48	2	8, 8.	R.
49-10	24-29	8-63	8-36	10	32-48	26-66	27-34	25-76	76-18	69-48	2	3 times.	R.
..	26-06	12-04	2-00	8-09	..	20-99	..	21-7	..	..	1	8, 8.	R.
39-70	35-58	26-13	22-41	21-72	22-11	43-14	33-30	32-95	25-63	41-46	2	..	R.
..	32-45	35-13	29-72	22-70	..	..	..	..	..	..	13	7, 2, 9.	R.
51-31	41-36	30-38	22-57	18-66	37-06	61-68	41-02	39-61	49-17	45-02	1	3 times.	R.
26-03	28-30	3-32	14-00	14-17	51-63	13-26	21-95	18-19	78-01	63-90	1	8, 8.	R.
40-33	33-00	19-13	2-76	2-304	58-70	22-76	31-89	27-32	71-70	62-04	34	..	R.
38-84	29-43	24-58	6-18	1-73	18-15	43-69	30-62	22-62	54-41	41-83	2	9, 12, 4, 8.	R.
44-45	31-15	22-4	8-45	4-18	25-17	49-43	22-67	27-66	60-43	48-24	3	2, 12, 4, 8.	R.
44-98	33-99	26-51	0-51	3-66	24-55	47-90	35-16	27-82	50-04	48-24	3	2, 12, 4, 8.	R.
55-90	46-61	42-00	36-32	34-71	42-29	56-24	48-49	43-44	24-19	21-50	24	2nd.	R.
41-00	32-43	25-17	3-73	2-33	19-17	52-07	23-50	23-63	66-59	54-00	1	3 times.	R.
..	17-50	13-29	23-00	0-80	7-61	..	..	..	..	..	1	7, 8.	R.
47	26-9	13	3-2	3-70	27-37	58-93	32-30	29-28	75-00	62-00	1	8, 1, 9.	R.
54-07	42-73	35-17	33-04	33-50	35-08	49-73	37-32	38-94	29	16-22	14	3 times.	R.
..	34-60	23-23	15-50	0-14	0-78	..	..	..	..	..	3	daily extr.	R.
53-04	44-59	33-98	25-32	23-18	32-39	54-01	43-21	38-30	36-93	30-83	1	..	R.
57-3	50-7	43-0	40-4	39-23	47-63	61-07	50-73	49-7	23-2	21-84	63	red.	T.

and coldest months.—† Difference of Summer and Winter.—R., Richardson, 'Bout-Voyage through Rupert's
in the American Nootka and Ooten Sibbens,'—T., Transactions Royal Society.—The rest of the climate
observations to the 10th Aug. only.—‡ 25–30 April.—§ 1–26 October.

VIII.—*Notice of a Meteorological Journal kept at Alexandria by*
 HUGH THURBURN, Esq.

Communicated by Capt. the Hon. H. A. Murray, R.N., F.R.G.S.

Read Feb. 23, 1852.

I AM not aware that continuous meteorological observations, for more than a few months at a time, have been made in Egypt since the time the country was occupied by the invading forces of France;—nor do I think that, as regards the observations registered, and published by either travellers or residents, at least such as have come under my notice, sufficient importance has been attached to the *various localities* selected for placing the instruments to be observed, or to that degree of punctuality in the hours of observation, *when a good position has been found*, which is necessary to give value to the labour performed.

Under such circumstances, and appreciating the force of the reflection thus made, I thought I might venture, to the extent of my limited power and means, to attempt to supply the deficiency, as far as the climate of Alexandria is concerned; and the following pages of observations, conducted for the uninterrupted space of three years, have been the consequence. I lay no claim to merit of my description beyond the utmost attention and accuracy in the execution of a self-imposed duty. When, from unavoidable circumstances, I was unable to be present at my post at the hour of call, my duties were scrupulously attended to by my brother Charles, and the blanks in my register, owing to his valuable aid, are few in number.

HUGH THURBURN.

Alexandria, 21st July, 1851.

Description of the Locality selected for an Observatory, and of the Instruments used, during the Years 1847, 1848, and 1849.

The great square of Alexandria (Egypt) is 462 yards long and 71 yards wide. Its length is magnetically $31^{\circ} 30'$ S. of E. and N. of W., or nearly three points off the magnetic E. and W.* The spot selected for an observatory was my dwelling-house, situated in the centre of the S. side of the said square, having a northern aspect, and, consequently, a free open space of 71 yards before it.

* By the mean of 22 meridian azimuth observations of the sun, taken during the month of April, 1851, I found the declination, or variation, of the magnetic needle at Alexandria to be $9^{\circ} 55' 22''$.

The barometers, thermometers, and hygrometers were placed on wooden shelves, painted white, in the centre of one of the windows (6 feet 8 inches by 4 feet) on the N. side of the house, outside the window but inside the green-painted Venetian blinds, removed from the walls, and beyond the effects of reflection or other improper influences. The air could circulate freely betwixt the window and the Venetian blind, but the instruments were protected by the latter from violent blasts or currents of wind, and from the rays of the sun, during his *most* northerly declination, by a projecting lath and plaster cornice which encircles the top part of the house wall. From the position of the house the sun's rays could merely interfere with the 9 A.M. observations, and only for a few weeks; but when the cornice, already described, did not afford sufficient protection, *at that observation* the instruments were previously removed to, and placed in a similar manner in, a window on the W. side of the house, having an open street 44½ feet wide in front of it. The ground-floor of the house is 3 feet English above the level of the sea.

1. The *Pluviometer* employed was Crosley's self-registering one, made by Watkins and Hill, of Charing-cross. Its position was on the terrace of the house, exposed in every direction, and without shelter from any adjacent objects. Height above the level of the sea, 64 ft. 6½ in. English.

2. The *Barometer* was one of Newman's Mountain Barometers, the error of which, as compared with the standard of the Royal Society, is minus 0.012 inch—that is to say, it would be required to add the above error to the readings of my barometer in order to obtain the indications of *that* of the Royal Society. The observations in my register are simply corrected for capacity and capillarity, and for nothing besides, and are not reduced to the usual standard of comparison, the freezing-point; nor has the error of the instrument been calculated in my corrections. The height above the level of the sea of the cistern was 41 ft. 3 in. English.

3. The *Thermometers* were made by Troughton and Simms, and compared with one of their *standards*, which I possess. Height above the level of the sea 43 ft. 4½ in. English, or 40 ft. 4½ in. English above the level of the great square.

4. The *Radiating, or Black Bulb, Thermometer*, made by Newman, and also compared with Troughton and Simms's standard, was placed on the S. side of the house, at a distance of 2 ft. 2 in. English from the wall, and 3 ft. 8 in. English from the ground, with an open space behind, free from building, of about 120 feet.

5. The *Hygrometers* in use were made by Newman, of Regent-

street, with the usual cistern for distilled water, and wet and dry bulbs, and with the scales divided to tenths of a degree of Fahrenheit. The dew-points were calculated according to the formula given by Dr. Mason, and the degree of dryness found by deducting the dew-points from the temperature of the circumambient atmosphere. Height above the level of the sea 43 ft. 4½ in.

6. The *Anemometer* used was Lind's, made by Newman, and placed at an elevation of 68 ft. 4 in. English above the level of the sea. Surrounding space perfectly open and unsheltered.

7. The weathercock, or vane, was likewise fixed on the terrace of the house, at a distance of 69 ft. 4 in. above the level of the sea, and equally exposed, and unsheltered by neighbouring objects, with the anemometer and pluviometer. The true N. was found by astronomical calculation.

8. Alexandria *mean* time was used for the hours of observation, and was obtained from a Dent's dipleidoscope, which I placed by double altitudes of the sun, frequently repeated and checked, in the plane of the meridian; and then permanently fixed it *there*. Correct *true* time was thus converted into *mean* time, and transferred to a Barraud's chronometer, which was again transferred to a common clock, set 2 minutes fast, and which, in striking the hours, was heard in every corner of and even beyond the dwellinghouse, thus giving loud and sufficient warning of the approaching hour of observation. In Egypt, as in most Mussulman countries, public clocks are unknown; and the only *reference* of time, at the command of the uninitiated, is the *not* unerring voice of the Muezzin, from the minaret of his mosque, summoning the faithful to declare the unity of God and the apostleship of Mohammed.

The titles of the columns of the Journal are as follows:—(1) Date; (2) Pluviometer at 9 A.M.; (3) Barometer corrected at 9 A.M.; (4) 3 P.M., and (5) 11 P.M.; (6) Thermometer attached at 9 A.M., (7) 3 P.M., and (8) 11 P.M.; (9) Temperature, maximum, and (10) minimum; (11) Dew-points at 9 A.M.; (12) 3 P.M., and (13) 11 P.M.; (14) Absolute dryness at 9 A.M.; (15) 3 A.M., and (16) 11 P.M.; (17) Mortality, males, and (18) females; (19) Winds and weather at 9 A.M.; (20) 3 P.M., and (21) 11 P.M.; (22) Number of days in the month during which each wind prevails. There are also hourly observations of most of the above-named instruments on the 21st of March, 21st of June, 21st of September, and 21st of December.

The original MS. Journal is preserved in the archives of the Royal Geographical Society.—Ed.

The following table, showing the mean temperature of the seasons and the quantity of rain at Alexandria, as obtained from Mr. Thurburn's three years' observations, was prepared by Colonel Ph. Yorke, and exhibited to the Society at the meeting.

—	Winter.	Spring.	Summer.	Autumn.	Mean.
Temperature, Fahr. .	58°·54	56°·46	78°·34	73°·81	69°·29
Rain in inches . .	6·247	0·278	0·008	0·974	7·507
					Total

TABLE of Mean Monthly Temperature at Alexandria, from Observations by Hugh Thurburn, Esq.

—	1847.	1848.	1849.	Mean.
January	58°·28	56°·87	56°·94	57°·36
February	60°·06	58°·73	54°·70	57°·83
March	63°·32	61°·67	61°·49	62°·16
April	67°·10	65°·66	68°·19	66°·98
May	70°·81	69°·98	69°·99	70°·26
June	76°·72	76°·53	75°·46	76°·25
July	78°·23	78°·17	79°·05	78°·50
August	80°·29	80°·53	80°·04	80°·28
September	78°·57	77°·43	78°·40	78°·13
October	73°·87	76°·43	74°·27	74°·84
November	66°·57	69°·86	69°·09	68°·47
December	59°·27	61°·58	60°·47	60°·44
Mean	69°·43	69°·46	69°·01	69°·29

IX.—*Extract from Vice-Consul C. H. DICKSON's Report of his Journey from Tripoli to Ghadamis.*

Communicated by the Foreign Office.

Read March 8, 1852.

THE accompanying map shows the route from Tripoli to Ghadamis usually taken by caravans, and which I followed in the year 1849. It is constructed on a spherical projection, from bearings taken with a Kater's pocket-compass; and in order to determine the distance from one stage to another, I employed a string 1000 yards long, held at each extremity by a man on foot, who proceeded along with the caravan, marking every length of the string, while I at the same time noted them down, and marked also the hour of departure and arrival.

As the present route has never before been travelled over by Europeans (Major Laing and Mr. Richardson, the only two Christians who visited Ghadamis before me, having proceeded, the former through Wady Shiaty, in Fezzan, and the latter *via* Seenawan), I shall add a short description of the most remarkable

stages, beginning at *Zanzour*. This is reckoned one of the finest districts on the coast of Tripoli for richness of soil and good water, and enjoys, moreover, a healthy and temperate climate. It contains a population of about 4000 Arabs, besides a few Jews. The village, from whose centre rises an old Moorish castle, is closely hemmed in with gardens, surrounded on every side by hedges of the cactus-opuntia, or prickly-pear bush. Its productions are olive-oil, melons, corn, dates, and onions, which are particularly esteemed throughout the regency. Starting from this village, a fine broad road leads through the small oases of Seyad and El Maya to *Zawia*, which is considered one stage from Tripoli, distant 25 miles. This is a large district, and the residence of a Raïd, who has also under his jurisdiction the oases of El-Harshia, Bou-Asa, Ogba, Sorman, Dahman, Bou-Ajeela, and Zongha, containing an aggregate population of about 20,000 souls, belonging chiefly to the tribes called Orshafana, El-asà, and Juari; there are, moreover, some 500 resident Jews. I may also observe that the natives have claim to sanctity, on account of their descent from a noted Maroequine marabout, by name "Sidi El-ljeh," who, according to tradition, was the first propounder of the Mahomedan faith in these parts, about the twelfth century. The quality of its soil is much inferior to that of Zanzour, yet *Zawia* yields the same productions. To these, however, must be added extensive plantations of tobacco, of an indifferent sort, which is monopolized by the Government. The climate in some localities is unhealthy, particularly in the oasis of Soagha, where ague is very prevalent in autumn. A fact worthy of notice is the recent introduction, under the auspices of Government, of silkworms, the rearing of which, owing to the number of mulberry-trees they possess, promises to extend rapidly throughout these villages. A fair is held at *Zawia* on Mondays and Thursdays, to which most of the neighbouring tribes resort. From *Zawia* caravans are directed to a well called Homra, distant 7 miles, passing first through the gardens of El-Harshia; the water being superior to that of Shannabiyeh and El-khoreji, a sufficient quantity is here collected to last till they reach the Jebel Mountains, a journey of 2½ days, being all together about 100 miles from Tripoli. There are no villages between *Zawia* and the Jebel, except the oases of Shukshuk and Joosh, at the foot of these mountains, which I shall refrain from describing on account of their lying out of the present route. On quitting *Zawia*, the ground keeps gradually rising, and presents but few sand-hills; the whole tract consists of a prairie covered with brushwood, with occasional patches of corn-fields scattered over it, the latter the property of the Bel-arà and Jedouri tribes. The spot marked El-Gharga is a halting-place in a hollow on the plain; and

Wady Ethel is not a running stream, but merely a narrow torrent-bed, containing a little rain-water in winter, and on the borders of which grow clusters of wild tamarisk-trees, whence it derives its name. After quitting Wady Ethel, and as you gradually approach the mountains, this lofty range, with its tapering peaks and bold elevations, becomes more fully displayed, and, as the ground rises, beds, consisting of sharp flints and pebbles, occasionally interrupted the solemn but sure pace of the camel; in other places the hills are covered over with wild thyme, and a variety of aromatic herbs peculiar to these elevated regions. Caravans now proceed either to Yefren, to Zintan, or to Rujban, but more commonly to the two latter, from the circumstance of the camel-drivers being natives of these places. Yefren is the chief district, and the residence of a *kaimakan*, or lieutenant-governor, whose authority extends over Ghadamis, and over all the Jebel and Gharian range. Since the subjugation of the Jebel in 1844, the Turks have erected a fort at Yefren, in which are stationed 500 troops, being the total amount of garrison force in these mountains. A military road has lately been constructed leading to it from the foot of the mountains. The Jebel is evidently a continuation of the Atlas chain, and commences at the Tunisian frontier, and extends in a north-easterly course as far as the Valley of Kirdmeen, where it joins with the Gharian; it is remarkable for the ruggedness of its surface, and presents a striking contrast to the Gharian and Tarhona ranges, by displaying everywhere massive rocks of flint and hard limestone, intersected by innumerable ravines and precipices. Perched on the summit of these immense blocks are seen the villages of the natives; while in the valleys below, corn-fields and clumps of date and fig trees present an agreeable relief to the eye. By observations made by Dr. Overweg, the African traveller (attached to the late Mr. J. Richardson's Mission), the highest peak in this range, which rises in the neighbourhood of Yefren, is 2800 feet above the level of the sea. The houses have merely one story, and are of very rude construction, being low and irregularly shaped; they are built of stones cemented with gypsum, but without plaster on the outside. The district of Zintan, however, forms an exception to this rule; the natives, like those of the Gharian, living in subterranean cells. In those places which possess no wells or springs, tanks are constructed for collecting rain-water, which is then reserved only for domestic purposes, no irrigation being allowed to the soil in summer. Fassato and Yefren contain the purest water, supplied from living streams.

The population of the Jebel may be roughly estimated at

60,000, comprising about 1000 Jews, which latter reside chiefly at Kikleh and Yefren. It is divided into 16 districts, subdivided into villages, and each possessing a sheikh, a kadi, a mosque, and a kasbah, or blockhouse, erected in feudal times for purposes of defence. The largest and most populous district is Fassato, divided into 11 villages, and containing altogether about 6000 souls. The other districts are in succession from E. to W. as follows:—Rabtah, Kikleh, Yefren (*Jedaret*), Khlaifa, Riaina, Zintan, Rujban, Raheibat, Hraba, Tumzeen, Kabao, Hawamid, Oulad Mahmond, and Naloot.

The natives form three distinct classes: one which claims to be aboriginal, and must have descended from the Berbers, whose language it partly retains, having some affinity with that spoken by the Tuaries and natives of Ghadamis. This class does not belong to any of the four orthodox sects of Islam, but in common with the Wahabites it differs on various dogmas, thereby embodying itself into a fifth order of Mohammedans, hence termed Khoamsa. The second class consists of nomadic tribes of Arabs, some of whom also reside in villages. Though living in promiscuous communities, these two classes seldom or never intermarry; and, in former times, they continually retaliated upon each other their implacable feuds. The number of Khoamsa amounts to about 32,000, who reside principally at Fassato and Yefren. Besides these, there is another tribe, amounting to 9000, called Siaan, which inhabits the plains below, and the oases of Joosh and Shukshuk. These are noted for possessing numerous flocks of sheep and camels, to the amount of about 100,000 of each. The Jebel produces an abundance of olive-oil and corn; besides dates, figs, grapes, melons, a few vegetables, wool, and butter. Fassato supplies the greatest quantity of oil, having altogether about 12,000 olive-trees. The quantity of barley usually sown exceeds that of wheat by one-half, and gives an average of sixty-fold. There are also extensive manufactures of goats'-hair sacks and woollen blankets, but all of very coarse texture. The amount of taxes exacted from this portion of the regency, exclusive of Ghadamis, is 24,000 mahbous (4000*l.*). This sum is rated according to an estimate of the number of sheep and cattle each village possesses. Government claims, moreover, a tenth part of the annual produce of corn and oil. These taxes are paid in quarterly and sometimes half-yearly instalments, and are a source of endless complaint on the part of the natives, owing to the inequitable mode in which they are assessed.

Among the objects deserving of notice in the Jebel are numerous ruins of ancient Roman towers, scattered over the whole of its surface, some bearing inscriptions. The following epitaph was

found in the Valley of Rounieh, during my journey from Yefren to Zintan :

DMS
IVLIA FAVS
TINA VIXIT
RPAA NNXXVIII
MXIDXXVIV.....ION
RAIVS.....LII.

Having quitted Zintan, the caravan now entered on the desert of Sahara, the greater portion of which, to within a few miles of the oasis of Derge, is not entirely destitute of vegetation, but affords abundance of brushwood and shrubs, serving as food for camels ; while, on the other hand, this immense expanse teems with herds of antelopes, ostriches, wadan (*Ovis tragelaphus*), and bagarr-el-wahsh, or wild ox.

There are no villages between the Jebel and Derge. Tlag-sheen is a solitary well of indifferent water, 2 days' journey from Zintan ; and the other points of my route marked on the map are mere halting-places and landmarks, the whole line presenting, at intervals, ridges of hills composed of sandstone, more or less blackened by the influence of the atmosphere, and occasionally, though seldom, a few sand-hills. In some parts the soil is remarkably fertile, yielding a rich pasture in spring, when it is visited by wandering Arabs with their flocks.

The Hamada (table-land) consists of an extensive stony plain, stretching across the Sahara as far as Fezzan ; and Sreer-*ej-jeleb* is a wilderness, so named from its being often fatal to sheep while traversing it, owing to its utter sterility.

After a journey of 6 days, the caravan reached Derge, a distance of nearly 180 miles from the mountains. It consists of 4 oases—Derge proper, Tugoutta, Matris, and Hilselt—situated at no great distance from one another, and separated by ridges of stony hills. Matris is more elevated than the rest ; a salt plain intervenes between it and Derge, which probably accounts for the unhealthiness of its climate. The water, likewise, of these oases, except that of Matris, is deemed unwholesome. The population may be computed at 2000, and, unlike that of Ghadamis, is essentially rural, yet speaking the same language. The staple produce is dates, of a superior quality, corn and gussob-grapes ; apples and vegetables are also reared, but in small quantities.

These oases pay a tax of 1050 mahiboubs (175*l.*) a-year to the Pasha of Tripoli, besides the other of a tenth part of the annual produce of corn.

As you proceed from Derge to Ghadamis, the road is at first rugged and difficult, leading through a deep labyrinth called Wady Attaf, then over high sand-hills to another hollow, the Shanbeli,

whence it emerges in a north-westerly direction, bearing towards two high prominences, called the Krub, at the base of which lies the track that conducts to Ghadamis. The Shaabeh and Krub are noted haunts of the Shaanbah robbers. From the Krub the palms of Ghadamis are just perceptible, displaying a dark streak in the horizon; and, as you gradually approach this oasis, the soil undulates over thick layers of gypsum.

Concluding Remarks.—The distance from Tripoli to Ghadamis, as computed according to my measurements, is 320 geographical miles, the whole journey having occupied 17 days, exclusive of stoppages. This route is not the shortest, but, from the fact of its being less exposed to the incursions of the Algerian robbers, is preferred by caravans to the more direct one of Seenawan and Hraba, an easy journey of 10 days, and which I suppose to be some 250 miles long, at an average rate of 25 miles per diem. My journey may be deemed a fair rate of caravan-travelling in winter, giving as daily average 18 miles in 8 hours, or $2\frac{1}{4}$ miles per hour.

A remarkable feature in the geological structures of this part of the Sahara is the numerous shells and other organic remains with which it abounds. These are observable in the vicinity of Tlagaheen and in the neighbourhood of Derge; the localities in which they exist presenting more or less marks of sterility.

X.—*Notes from a Journal kept during a Hunting Tour in South Africa.* By HENRY S. GASSIOTT, Esq.

Communicated by Colonel SIKES.

Read March 22, 1852.

THE few remarks I now offer to the Royal Geographical Society will, I trust, be viewed with some indulgence, as my recent visit to Southern Africa was never intended in my own mind to be one of geographical research. The few observations which I have now to present to the Society may, however, be of some service in the guidance of future travellers.

On a recent map, kindly given to me by Mr. Arrowsmith previous to my departure from England, I marked my course by compass, taking 3 miles per hour as the speed of a regular bullock-waggon. This was entered in a rough journal which I kept, from which I have made extracts, comprising the particulars contained in the present paper.

I left London in the 'Agincourt,' accompanied by two friends, on the 19th of July, 1850. We arrived at Cape Town on the 20th of September, when we had the mortification of being in-

formed by a gentleman who had just returned from the interior, that, in consequence of the disturbances with the Boers, we could not proceed on our intended route. Fearing to lose the season, we then chartered a small vessel to Angra Pequena. We landed here in a large bay surrounded by sandhills, extending, as I afterwards ascertained, for some miles into the interior. Here we were detained about 5 weeks, during which we rode to a place called Bethany, in order to procure the necessary oxen.

The country in the vicinity of the sea consists of a series of sandhills, and is entirely devoid of water, with which, during the short time traders remain, they are supplied from the Cape. The beds which are marked as rivers in the maps are dry at all seasons of the year. The nearest water is about 20 miles from the bay, but very brackish, at a fountain called Viow Viowsep, from whence the country continues sandy, with a grassy defile of some miles in length, named Teiras Flat, but without water. The next fountain we meet is Quebes, so called from its stony nature (Quep signifying stone in the Namaqua language). From Quebes the country to Bethany is barren, until you arrive within about 2 miles, where some camel-thorns and willows grow. At Bethany there is a fountain of fine water, and a missionary, named Kreutzen, resides there.

Circumstances prevented our continuing the intended journey, which otherwise might have proved interesting; but I was happy, on my arrival in England, to learn that Mr. Galton had succeeded in pursuing his course in this direction.

We remained at Bethany 3 weeks. The first water on the road from thence to the southward has to be dug for about 2 feet, when it flows comparatively freely. From this place to Kardop no water can be procured, the country being rugged and full of the mimosa, as far as Hudap, a large Bushman kraal, and Hoons, which is already marked on the maps. Here we found water, but the heat was fearful, 105° in the shade. From thence we proceeded to Kaidorp Grotpoort, where we obtained an abundance of water; and 2 days' journey brought us to the Orange river, which we crossed at a part between 200 and 300 yards wide. The country from thence to Cape Town has been often truly described as miserable, with a scarcity of water and scarcely any vegetation, excepting the euphorbias and ice-plant.

On our return to Cape Town my companions separated; one returned to England, and the other is still in the colony, prosecuting his researches in the interior.* From some information I obtained I was now induced to attempt another journey by way of Natal.

* Mr. Dolman, since murdered by the natives.—Ed.

I once more left Cape Town, and after a long passage of 33 days (usually done in 10) I arrived at D'Urban. The bar is bad, not allowing large vessels to cross: but the coast abounds with fine timber. I only remained at D'Urban 4 days, proceeding with my bullock-waggon, which I brought from Cape Town, 14 oxen, 1 horse, 1 servant, a driver, and 2 Kaffirs, to Pieter Maritzburg, a nice-looking village, and well watered.

From this place the ground ascends by the Bushman and Tugala rivers until reaching the Drakenberg or Quathlamba mountains. These latter are of considerable elevation, taking about 4 hours for the waggon to ascend to the summit, and after about 10 miles of undulating ground we arrived at Nelson's Head, the highest point of the range.

The country now is undulating, but quite devoid of bush, for a distance of about 140 miles to the Vaal river, which, at the drift where I crossed, is about 100 to 120 yards broad. From hence the road proceeds by Suikerbosch Rand, an inconsiderable stream, flowing into the Vaal, at which place is found the first settlement of the Boers. The country is covered with grass, but is fertile in corn and well provided with cattle. The bush is scarce, but sufficient for supplying the people with fire-wood.

About here I found many farms within a few miles of each other, but afterwards for three days I met with no inhabitants until I fell in with a Boer named Erasmus, at whose place, "marked on the map," there was at that time a "lager" or Dutch camp. This consists of a circle of waggons, the interstices of which are filled with strong thorn-bushes, affording thus a good defence against attacks from the natives. Passing onwards through Darepoort I arrived at Pinner's River, flowing, I believe, into Eland River. From this I proceeded to a beautiful spot called Boukenbouts Kloof, and soon afterwards saw the Eland River. The country in this part is covered with the mimosa, and is very rugged. A herb, poisonous to cattle from the end of October to the end of November, is found here, but when fully grown in December it is quite harmless. After leaving the farm of Cobus-uys, on the Eland River, I proceeded to the station, or rather outspan, of Inkle Doorn, or "single thorn-tree," and thence to Kameelpoort, which is marked in Mr. Arrowsmith's last map; a branch of Eland River runs here. Kameelpoort is so named from the numbers of giraffes which are found here. From Kameelpoort to the N.W. I had a fine view of an extensive table-land called Macapan's Hill, distant about 50 miles. Between Kameelpoort and Macapan's Hill, to the S. of the latter, there is a place called the Bad, or Warm-bath, which is correctly given in Arrowsmith's new map. I was informed that with this exception there was no water to be found in that direction.

For the sportsman this is a most interesting spot, and every kind of animal common to Southern Africa, the elephant and hippopotamus excepted, is to be found here. From this place I proceeded through mountain passes to a farm kept by a Boer named Van Dyck, a Veldt-Cornet, with whom I remained some days. A few miles eastward of this is Moose River. With the intention of proceeding towards Delagoa Bay by the Masouasi country, I crossed Melon River—so called from the bitter water-melon which grows very luxuriantly on its banks. The river winds through a chain of mountains and discharges itself into Elephant River. Continuing my route in a S.E. direction I came to a farm belonging to a Boer named Andreas Peice, to whom I had a letter of introduction; he was unfortunately from home on a mission to Delagoa Bay, and here I was stopped, being refused permission by the Veldt-Cornet to proceed through the Masouasi country. I had now no other resource but to retrace my steps and proceed by a somewhat different route to the northward to Leidenburg, a place containing about twenty houses, a fort, and chapel; here I applied to the landrost for permission to proceed, which was again peremptorily refused. Through the kindness of a Boer I was enabled to rest my oxen, and proceed with him in his waggon to Origstadt, situated in a fertile but unhealthy spot, surrounded by mountains. I was here attacked by fever and ague, and returned to Leidenburg, whence I proceeded through Steelpoort and Magnetshoek, on an inclined plain about 3 miles long. I found the ground thickly covered with magnetic ore, of which I brought home a specimen. At Steelpoort there are numbers of shells, two of which I also brought to England.

From Magnetshoek I proceeded to Soquati's kraal. This, the principal chief of the Mantatees, furnished me with a number of his tribe to attend and assist me in hunting. The water here is detestable, and a large kind of cactus grows in great abundance. Crossing the Elephant River several times, I left my waggon and oxen under the charge of my servant, and proceeded on horseback with the driver and pack-oxen, and accompanied by eighty to one hundred Mantatees. Avoiding Zout-pans-berg, the furthest settlement of the Dutch Boers, who would in all probability have detained me, I arrived at the Limpopo, which I crossed, and which was my furthest point. The river, at this part, was about 200 yards wide, very shallow, in some parts not over the horses' knees, and alligators were abundant. Before I arrived at the Limpopo I found the bush very thick and abounding with the flies (*setse*) so destructive to cattle and horses, and which render travelling in this part of Africa so very difficult.

Previous to my leaving England Mr. Arrowsmith had urged upon my companions the desirability of endeavouring to trace the

course of the Limpopo to the sea, and I had not forgotten their conversations with this gentleman, but I regret that it was out of my power to collect any certain information on this point for the Society. I may, however, add that I made every inquiry in my power of the Boers, several of whom informed me that they had penetrated far into the interior; one, named Trechart, had been as far even as Sofala. They all affirmed that the Limpopo and Elephant River join each other and then flow into the ocean at Inhambane, a Portuguese settlement on the coast. At the junction the river is said to be over a mile in breadth. The Elephant River is in places very rapid, full of falls and drifts. In conclusion I can only say that much self-denial, untiring energy, and dogged perseverance are indispensable before geographical discoveries can be made in this part of Africa; and even these qualifications will be of little avail, unless assisted by subordinates possessing local knowledge of the country and of the habits of the Boers, as well as of the natives. The prejudices of the Dutch Boer are great in the extreme; he views every stranger with suspicion, and, contented with his own uncontrolled sphere of existence, he aspires to nothing beyond. His hatred to the English name, however, I found more intense even than I had been led to suppose.

XI.—*Recent Expedition into the Interior of South-Western Africa.* By FRANCIS GALTON, Esq., F.R.G.S.

Read Feb. 23 and April 26, 1852.

MR. PRESIDENT,

A LITTLE more than two years ago, urged by an excessive fondness for a wild life, I determined to travel for a second time in Africa. I then became a Fellow of your Society, and through the active kindness of Dr. Shaw your Secretary, of Mr. Arrowsmith, and of others, I was thoroughly advised as to those geographical points which more immediately awaited inquiry, and, guided by their views, chose South Africa as the field of my travels.

I left England in April 1850, accompanied by Mr. Andersson, a Swede, to whose most active and cheerful co-operation throughout a tedious and harassing journey, I am in the greatest degree indebted. He still remains in Africa, principally with a view of investigating the natural history of the lake district, and of thence bringing home a complete collection of specimens.

At the Cape, upon the strong recommendation of Sir Harry Smith, I freighted a vessel for Walfisch Bay, instead of travelling the usual route from Port Elizabeth. The emigrant Boers had at

that time assumed a menacing attitude, and it was currently believed that they intended taking immediate possession of the lake country, and of refusing passage to all travellers from the Cape. Two parties had already been turned back; and as on the one hand there was every reason to believe that the same course might be adopted towards me, and cause a fruitless result to my journey, so on the other, the country to the north of Walfisch Bay was an entirely open field for exploring, and I proceeded thence.

At Cape Town I could obtain but little information about even those parts, in which missionaries had already formed stations, and what I there learnt was also much exaggerated, as the country was believed to be extremely fertile and very populous. The Damaras, into the heart of whose country no white man had ever penetrated, were described as a most powerful, numerous, and interesting nation; and the fact that some traders had settled at Walfisch Bay, whence large droves of Damara cattle were dispatched south, shipped to St. Helena, or sold to the, at one time, numerous guano and whaling vessels, seemed to warrant the opinion of the fertility of the country. This view was again confirmed by the great jealousy shown to the attempted expedition of our late member, Mr. Ruxton, afterwards so well known by his travels in America, who, when he landed, experienced such determined opposition and obstructions, that he was compelled to set sail without having penetrated more than 20 miles into the country.

Warned by his failure I took mules with me, besides my waggon and a cart, in order that I should be, to a certain degree, independent of assistance, and be able, at least, to carry my things across the barren desert, which intervenes between the coast and the more habitable parts.

I was also requested by Sir Harry Smith to establish, if possible, friendly relations on the part of the Colonial government with such tribes as were liable to be exposed to the attack of the emigrant Boers, and to disavow strongly all sympathy on its part with them. Indeed a mere expression of good will, without holding out the least prospect of direct aid, is a custom much valued and well understood by South African tribes generally.

I landed in Walfisch Bay, the estuary of the Kuisip, in August, and was very hospitably received by Mr. Bam, the Rhenish missionary. Some time and great trouble were required to drag all my heavy things with my few mules across the sandy desert, already mentioned, to his station, where they could remain in security whilst I went up the country to buy and to break in oxen for my onward journey. It would be out of place here to allude particularly to the extreme difficulty I experienced before all this

could be done and I could make my final start in February from Barmen. The country was in the utmost confusion; the Namaquas were robbing and murdering the Damaras in every direction, and had indeed, just on my landing, attacked and destroyed the Schmelen's Hope Station, that of Mr. Kolbe. I was fortunate in having good interpreters, and a black servant whom I had taken from the Cape, and who was born in some central part of Africa, found the language so much like his own, that by the time all was ready for a start he had become quite fluent in it; besides whom, I had a man, Damara born, but bred among the Hottentots, and to communicate with him, an excellent Dutch and Hottentot interpreter; so that I got on from the first extremely well.

The knowledge that Europeans possess of these parts, dates originally from Sir James Alexander, who, chiefly in company with Swartboys (a Hottentot chief), travelled from the south to Bethany, Rehoboth, and thence to Walfisch Bay; on his return he wrote to two missionary societies, recommending this country as a favourable field for missionary enterprise, in consequence of which some German Protestants and English Wesleyans were sent there. Their head-quarters were at and near Eikhams, the present home of Jonker Africander, who was at first a warm supporter, but latterly a bitter opponent of them. Subsequently the Wesleyans extended their missions towards the interior, and the Germans along the coast. Their present stations are marked on my map. When I arrived no European foot had ever penetrated 20 miles to the northward of the 22nd parallel of latitude, or 20 miles to the eastward of Elephant Fountain.*

My course from Barmen, as marked on my map, led me through the middle and most populous part of Damara land, at the further frontier of which one of my waggons broke down. I thence rode on across a bushman tract to the Ovampo, and returning, joined my then mended waggon, and came back to Barmen, which I reached in August 1851. I thence sent a messenger overland to the Cape to make arrangements for forwarding a vessel to meet me at Walfisch Bay in December or January, and lightening one waggon as far as I could, went with all my available oxen on a quick journey eastwards. At Elephant Fountain I joined Amiral, a Hottentot chief, and leaving my waggon there, rode on with him and explored to Otchoumbindé (called by the Hottentots Tounobis), and thence returning, arrived with utterly exhausted oxen on the coast in December 1851. From Walfisch Bay I sailed to St. Helena, where I waited some weeks

* In Sir J. Alexander's, and in the missionary maps, the positions of the more distant parts explored by them are laid down very erroneously. In one map Elephant Fountain is placed one hundred miles too far towards the interior.

in vain for an opportunity of making a short excursion to Little Fish Bay and of obtaining some information from thence. I consequently set sail, and arrived in England at the end of last month, after exactly two years' absence.

To avoid misconception I must give some explanation concerning the names which I have placed on my map, in the selection of which I had some difficulty. In all the border country, and where the missionary stations now exist, most places are known by two, three, or even four names. The Damaras have one, the Hottentots another—this latter, translated into Dutch, forms a third, which is used very generally—and the missionaries add a fourth; thus the place marked Scheppmansdorp, which is called Aban'hous in Hottentot, is always known as Roëbank by the traders and as Scheppmansdorp by the missionaries. It would have created great confusion to have attached all these different names to each place on the map, and I have therefore adopted the missionary names for their own stations, Damara names for all places that have them, and used Hottentot words as little as possible, for no orthography can possibly express their sound, except in rare instances, such as T'was and T'ounobis, which are capable of being pronounced. With perhaps less reason I have adhered to the Dutch word "Damara" to express the Oraherero and Ovampantieru tribes, as it is a convenient name and one that has been long established, and which has as much right to pass current as the word "Caffre." The Hottentot name for that people is Damup in the plural, or Daman in the singular, and this is the root of the name "Damara," which it is needless to state is utterly unknown to the people themselves.

The country over which I travelled, proved to be the broadly developed end of that chain of hills and high land which runs parallel and near to the western coast from the Cape colony upwards, and separates the Fish River from the sea. Though this country is dotted over with hills and even groups of hills, and is very deeply scored on its western face with watercourses, yet in its general aspect it consists simply of a plain sloping steadily away on all sides from a small district of the greatest elevation, which is situated about the sites of the mountains Omatako, Diambotodthu, and thence to Awass, and which (from boiling-water observation) lies some 6000 feet above the sea-level. From this district, the watershed *eastwards* falls with a very gentle inclination to the cup-shaped basin of Central South Africa—to its lake, its flooded lands, and interlacing rivers; *northwards*, with still less incline, to a large river, of which the Cunene is a tributary, and which appears partly to drain that basin; *southwards* from Awass, Fish River begins its long and peculiar course towards the colony; and the comparatively steep *western* slope is

ploughed up by the Kuisip, the Swakop, and five other more northerly river courses, which run into the Atlantic.

The sea-face of this broad belt is, except along the water-courses, uninhabitable, as during half the year there is no water and scarcely any pasturage. A strip of desert sand, 40 miles wide, follows the coast line, beyond which lies, north of Walfisch Bay, the barren Kaoko, and to the south of it the arid Namaqua land. The summit of the belt is a dense impracticable thorn coppice, though affording grass and a few scanty springs; but as we descend westward, and at about 220 miles from the coast, the thorns almost cease, and the land assumes the appearance of those broad plains, covered with grass and timber-trees, that have so often been described as lying between the Orange River and the Limpopo. Again, in the far north, at the latitude of Ondonga, the country becomes one of most striking and peculiar fertility.

Over all these parts the rains are periodical, and, from the nine years' experience that the Rev. Mr. Hahn has had at Eikhams and at Barmen, very variable. From the middle of May to November rain is scarcely ever known to fall, thence to January occasional and sometimes very heavy showers occur, but the true rainy season may be considered to be between the first of January and the last of April; the showers are extremely violent, but partial, and are always accompanied by thunder. The ground is seldom saturated till February, and then pools of rain-water (Vleys) are to be found everywhere; but, by June, all but the largest of these are dried up again. As a general rule, the rains fall most heavily on the summit, and on the northern and eastern slopes of the country, and, at Ondonga, they were described as being much heavier than in Damara land. The rivers are all *periodical*, and run to very different extents in different years. The Kuisip had been seven years without reaching the sea, and then almost, if not quite, reached it three times in six years. Of late, the Swakop has flowed three or four times every rainy season; yet, when it was first seen by Europeans, about ten years ago, the whole of the lower part of its course was choked with sand-hills, bushes; and trees; these the first inundation swept entirely away, since which most violent torrents have passed down it. On the other hand, it was a constant complaint of the Damaras, that less rain falls now in their country than some twenty or thirty years back; and even their extensive migration from the Kaoko, to which I shall have occasion hereafter to refer, has been ascribed by the Damaras to the water failing them for their cattle.

It may, perhaps, give a more accurate notion of the country I visited if I describe in some detail a route through it. Leaving

the excellent, but perfectly desert, harbour of Walvisch Bay—a journey of 16 hours across sand, soft and sinking at first and covered with shifting dunes, but afterwards hard and pebbly and crackling like frozen snow under the feet, takes us to Oosop. Ten miles before reaching the river, the plain shelves steadily and rapidly downwards to its bed, to which we descend at last through an imposing gorge about 300 feet wide and 4 miles long. The river-bed here is 100 yards broad, and consists of heavy sand, overgrown with patches of grass, and fringed on either side with a dense row of high reeds, beyond which, where the rocks leave sufficient space, are some fine groups of *Umba* trees. From the middle of the bed, a small streamlet springs out in all but the very driest seasons of the year, and after running some distance loses itself again in the sand. Notwithstanding a general appearance of drought, marks of violent torrents are everywhere visible,—trees lie uprooted, heaps of dead sticks and reeds and mud are washed high on the ledges of the rocks where they confine the river-bed, and also on the lower branches of the trees that still remain standing. The cliffs on each side are precipitous and magnificent. From Oosop to Daviecp there is, perhaps, no one single place where an expert mountain-climber could get out of the bed on the north or right bank of the river, and only two places where cattle can be driven up from the left bank. The rocks are so bold and so broken, especially on the right bank, that a traveller can hardly realise the idea that they are not independent mountains, but only the face of a deep cutting which the river has made for itself, and that the general level of the country is from 800 to 1000 feet above his head. I ascertained this elevation as well as I could, by climbing up a hill on the left bank, the height of which I measured carefully to be a little more than 600 feet; then from the top of it I levelled across to the opposite cliffs, from the top of which the plain began, and, with my sextant, guessed at the remaining height. The plain north of the Swakop appears at this place to be quite level and barren, but not sandy; and it is almost, if not quite, uninhabited. I had good views of it from many different heights. The Canna river cuts its way through it in exactly the same manner as the Swakop, though its cliffs are described as being even higher. I could trace its course for a distance, from a hill near Hycomkap; and an appearance along the plain, as if the ground were broken up, indicated, for 20 or 30 miles, the gorge through which it ran. On leaving Daviecp, the cutting through which the river flows loses the character of a gorge, and the mountainous sides open out more, continuing still to bank up the plains. Those of Ouanis, 20 miles east from the left bank, give excellent pasturage, and the desert sand ceases about Tinas. Passing up the Tsobis river to avoid the deep sand of

the Swakop, after 7 hours' up-hill travelling, through gorges nearly as striking as those of Oosop, we emerge on the plain, which we now find everywhere covered with thin grass, and studded over with stunted thorn trees. The "Hakis," or Fish-hook thorn, as the Dutch call it, begins to grow at Tsobis, but the land more to the westward is too barren to give sustenance even to that, and from this point to the borders of Ovampo-land the traveller has to tear his way through its cruel and tangled branches. Not a tree grows that does not bear thorns, and very few in which the thorns are not hooked; and their sharpness and strength are such as to throw a most serious difficulty in the way of exploring, especially as when travelling with a waggon, the oxen will not face them, and in difficult parts it is often quite impossible to get through the bushes, round to the struggling and fighting oxen. Cruel as the Hakis thorn is, there is yet another and much more severe opponent in a smaller, but sharper and stronger thorn. I have frequently tried the strength of all these with a spring weighing machine, by tying a loop of string to one end of it, which I hooked round the thorn, and then steadily pulled at the other end till the thorn gave way, marking the number of pounds resistance that the scale indicated at the moment the thorn broke; the Hakis thorn stood a pull of 4 or 5 lbs., and the other one of about 7, but often much more, and on one occasion I registered a strain of 24 lbs. Now, as several of these thorns generally lay hold of the traveller's clothes or person at once, it may easily be conceived what cruel laceration they cause. Continuing our route we descend to the Swakop again, near Otjimbingue, having, when at Tsobis, just caught sight of Erango, a mountain 3000 feet above its base, but rising from the deep hollow of the Canna. From Otjimbingue to Barmen the river passes again through a broken, confused series of gorges, and among mountains; and it is not until we are far past Schmelen's Hope that we arrive at the source of the Swakop, and entirely clear of its valley. At the time of my visit to these countries, Schmelen's Hope, and a very few miles north of it, was the furthest point known to the missionaries, and other Europeans. As I travelled northwards, ascending the plateau, I saw the tops of the hills by the river, that had appeared so prominent when among them, slowly sink down below my level, and disappear among the trees. Dianbotodthu no longer bounded the prospect in front, but on a sudden the two magnificent, almost faultless cones of Omatako burst full into sight, each appearing like a Teneriffe, beyond which was the broken ground of Otjilinna ma Parero, and the long wall of Koniati, that bound the arid Kaoko. I had but just left a tributary of the Swakop, still a broad river bed, when, to my surprise, I came upon another water-course of considerable size, running N.E., which I followed

some distance, and which I found went towards the Omoramba. It seemed incredible that a water-course 30 or 40 yards broad, with steep banks, could have an origin in the open plain within a mile, but I found afterwards that this sudden commencement of broad river beds was the rule, and not the exception, in Damaraland. I had also constantly noticed that the breadth of the river beds was often out of all proportion to the quantity of water that they could ever carry: thus the Erora, which has not a course of more than 20 miles and is by no means an important drain to the country, is about 500 yards across, but I found that the same cause influenced both the length and the breadth of the river bed. It must be recollected that the ground is entirely sand, but well fixed on its surface by the long running roots of the grass that covers it. The wet in the rainy season drains through the sand into the river bed, and, of course, constantly washes away some with it; but the subsoil yields before the surface, and thus the banks get gradually undermined, and are always falling in, so that the river has a constant tendency to grow broader, and to push its apparent source higher up towards the water-shed. It is very curious to see the head of one of these river courses, where the ground seems to have fallen in suddenly, leaving a place like a gravel pit, whence the bed begins at once some 12 or 20 yards wide, and perhaps 10 feet deep.

In the case of the Omoramba K'omatako, whose course lies alternately over districts of sand and over hard ground, it is very curious to observe how, what in the first case is a fine magnificent river bed with high banks, suddenly, as the ground becomes hard, loses itself in the open plain, where there is not a vestige of its course; and a few miles further on, the ground becoming sandy, the river bed re-appears again, just as unexpectedly as it had been lost, and altogether as large as before.

I had made a considerable *détour* to avoid a very hostile tribe of Damaras, who were then encamped on the Omoramba, and through whose neighbourhood my men refused to attempt a passage. I, therefore, guided only by such vague information as I could then occasionally procure from the savages, went under the escaped sides of Omuvereoam, at the termination of which the reported lake Omanbondé was said to lie. Through the whole of this road I had to trust to chance in finding water, and in also finding a practicable road for waggons. At this time my men were undisciplined, and in no way to be depended upon. My oxen were only half broken. There was fighting going on between two powerful tribes immediately behind us, and a dense jungle of thorns surrounded us on all sides. Of game there was none, so that it was impossible to depend on anything else but my oxen for food. The waters were drying up on all sides, and

the prospects of the expedition became gloomy enough. I chanced, however, to fall upon a curious watercourse, that we named the River Vley. It was a narrow strip of green, not much depressed below the country on either side, which contained frequent shallow pools. It was simply a succession of Vleys or pools, and varied from thirty yards to much more in width, and here and there stretched out into broad plains; the thickest of thorn jungle, and one perfectly impassable to a waggon, pressed close upon it, so closely that the waggons were frequently taken through the water where there was not room for them between the Vleys and the thorns.

It is wonderful how little inhabitable country there is in this part of Africa. Either the thorns occupy the ground to the exclusion of everything else, or drought makes it unfit for cattle. In fact, Damara-land is made by the watercourses and a very limited number of springs; take away these, and no pastoral people could inhabit the country; whilst agriculture, except to the most limited extent, is in all cases out of the question. The watercourses, though utterly arid to all appearance, are really to a great extent reservoirs of water, which is checked in its evaporation by the great depth of sand that overlies it. There are places known to the natives in most of these river beds, and which probably correspond to the lowest parts of the longer reaches, where water can be got by digging; but it is useless, as I am well aware by long experience, to dig deeper than the sand, for no water exists in the hard ground below it. It must not, therefore, be in any way supposed that, because I have dotted out in the map a large space and called it Damara-land, the whole of that area is occupied by these people. The case is far different. The number of pasturages is extremely small; and I am sure that I myself have seen and know quite half of them. It will be easily understood also that the boundaries of a people like the Damaras are exceedingly arbitrary. It rains perhaps heavily one season, and there is abundant Vley water at a distant place, where the pasturage is also good; the neighbouring tribes, of course, flock there, and spare the grass nearer their usual haunts and more certain waters until the dry season. The boundaries are not definite and natural, excepting so far as the long range of Omuveroon is concerned; but they are decided to a certain degree by custom, and I have endeavoured, under this view only, to represent them on the map. One point bearing on this subject must not be forgotten—that two African tribes never live close up to a common frontier. They are always fighting and robbing, and therefore a broad border-land is essential; and in these border-lands, so far as I have seen, the Bushmen and other outcasts live. As regards the water that these get, it will

easily be understood that many places are found which yield enough for a small family, but which would scarcely support two or three oxen. The water oozing slowly into a well from the damp sand surrounding its bottom, at the rate say of a gallon in a day, is a case often observed, and then the tracks of Bushmen are pretty sure to be seen about it also. But to proceed with my itinerary. Just where the Vley River began to be lost the bushes became more open, and Omuveroom sloped down into the plain, and I here met with guides who took me straight to Omanbondé. This had been constantly described to me as a large lake. I thought it might have been the Demboa of early maps, with whose position it fairly coincides, and to whose name Omanbondé bears a certain resemblance.

The occasional existence of hippopotami in it was also thoroughly substantiated, and yet, when I saw it, it was *perfectly dry*. The place is a remarkable one enough, for it is the long reach of a watercourse, closed up at both ends by a dam, which, together with its sides, slope upwards till they attain an elevation of about 100 feet above the bed. The breadth of Omanbondé is trifling, but its length is some 8 miles. Going downwards, and passing over a broad dam, we come into another reach also dammed up, and then again into another. N. of Omanbondé there are also two other places just like it. The water evidently filters through these dams in the rainy season; and I was assured that, even in the driest times of usual years, Omanbondé was a reservoir of water: I, however, to my great misfortune in many ways, chanced to travel during a year of great and almost unprecedented drought. The course of the Omoramba downwards was so clogged with thorns as to be quite impracticable for a waggon, and it was indeed with great difficulty that we even crossed it.

On leaving Omanbondé, and getting out of the valley of the Omoramba as well as I could, we came to a far more open plain than any I had hitherto met with; and suddenly, at lat. $19^{\circ} 50'$, found ourselves among palms—the harbingers of a better land. A little further on they flourished to the exclusion of almost every other tree; but before we came to Okanabuti had ceased almost as suddenly as they began, though during the whole road to Ovampo-land one or two were every day to be seen. We had now arrived at a much more luxuriant country, and water was plentiful: a long limestone ridge at Kutjianashongué yielded springs in numerous places, around which large herds of cattle and numbers of Damaras were collected. Timber-trees began to appear, growing in clumps, with long open grassy savannahs between them; and to me it was a constant wonder to observe the straight and perfectly defined borders that these belts of wood presented. Here and elsewhere I have seen them look, not

as one would conceive that Nature could have planted them, but presenting exactly the appearance of the work of an ornamental gardener. I am in no way able to account for this striking peculiarity, as there is no perceptible difference in the soil on which the trees grow, and in that where they are absent. I cannot explain the fact, but simply state it. Okamabuti may be considered as the northern boundary of Damara-land, though in the rainy season the natives sometimes go further. The country is said to be quite impassable to the N.E. It appears to be entirely uninhabited, and is thickly wooded. I made an excursion to a hill in that direction, about 8 hours off; but, so far as I could see from the top of it, one level forest extended far away.

The masses of hills that lie to the N.W. of Okamabuti are all limestone. I saw a good deal of them from the guide having lost his way more than once when he first took us there, which ended in compulsory and anxious wanderings for more than a week about them. A great many Bushmen live among these hills. I saw there a most curious freak of nature, which I afterwards witnessed on a far more magnificent scale at Otchikoto. Wherever a piece of bare rock is to be seen (which is nearly everywhere between Ootui and Otchikoto), it is pierced with holes perfectly circular, and of all sizes, and like round smoothed tubes. Thousands of them would just admit the thumb, and are quite shallow; numbers are about the diameter of a bucket, and from 3 to 5 feet deep, forming most dangerous pitfalls: in many of them we find trees growing, some not quite filling the hole, others just fitting it, and, again, others so constricted that the trunk swells over and entirely hides the sides of the hole. I saw a few holes about 8 feet across, but I do not recollect observing any intermediate size between that and Orujo, a perfectly circular hollow in the midst of chalk about 30 feet deep and 90 feet across. The sides of this were certainly not smooth, but they formed an exact circle, like a gigantic pan, the floor of which was level, with a small well in the middle. Otchikoto was still more astonishing. Equally circular, and its sides equally steep, it measured 400 feet across, and was almost filled with the clearest of water, the level of which stood at 33 feet below the banks, with the extraordinary depth of from 170 to 180 feet, which I plumbed in five places. I heard there was another, if not two more of these places, somewhere among the Soua Damup. The water-level of Otchikoto was, as I was told, and I could myself gather from appearances, not increased in the rainy season.

I was fortunately not encumbered here with my waggons, for I do not think it would have been possible to have taken them on through the thick forest. Here there is not a single landmark to

catch the eye, and nothing but the most skilful tracking could find the road when the rain had obliterated the spoor of the preceding year. We got water at Otchando, and came to the first Ovampo cattle-post at Omutchamatunda. Travelling on, we arrived suddenly at the large salt-pan of Etosha, which is about 9 miles across from N. to S., and extends a long way to the W. The mirage was too strong to admit of my measuring the distance of the high banks that there bound it, and which I could just make out both as I went and as I returned.

This lake is impassable in the rainy season, but was perfectly dry when I saw it, and its surface was covered over in many parts with very good salt. A little further on we come to the remarkable Otchihako-wa Motenya, a perfectly flat, grassy, but treeless extent of country, stretching like an estuary between high and thickly wooded banks. It is said to extend a very considerable distance W.; indeed, I cannot help thinking even down to the sea-coast. I passed it near its head, where it was only 12 miles across; but where the Ondonga and Omaruru route crosses it, it is a long day's journey from side to side, and all the Damaras who had been that route assured me that it extended as far as they knew to the W. Again, the Omaruru and Onganjera route crosses a flat of three days' extent, but in which there is some water, and which is asserted, and indeed appears, to be identical with it. It is looked upon with great horror by the Damaras from the bitter coldness of a night passed upon it, as there is of course no fuel and no shelter.

It is difficult for me to express the delight that we all felt when in the evening of the next day we suddenly emerged out of the dense and thorny coppice in which we had so long been journeying, and the charming corn country of Ondonga lay stretched like a sea before us. The agricultural wealth of the land, so far exceeding our most sanguine expectations,—the beautifully grouped groves of palms,—the dense, magnificent, park-like trees,—the broad, level fields of corn interspersed with pasturage, and the orderly villages on every side, gave an appearance of diffused opulence and content, with which I know no other country that I could refer to for a parallel.

I arrived ultimately at Nangoro, the king's werft, where I spent three weeks most pleasantly. But my oxen had fallen lame and sadly out of condition, and I felt some misgivings as to whether they could even take me back, and there was no grass for them at Nangoro's eat. All his cattle were sent far away to the rattle posts. Half my party were left scarcely in a fit state to protect themselves among the Damaras, and I had often anxious thoughts for their safety. My provisions were getting very low, and unless more cattle could be bought in Damara-land we had

not sufficient to take us back even to Barmen, where we had left the missionaries in too great want to be able to help so large a party as ourselves. The country too was fast drying up, and the road southward might become impassable; still the *great river* was only four long, or five comparatively easy, days ahead; but this and the return journey, together with the rest necessary for my oxen, I was aware would be at least a three weeks affair, and I hardly knew what course to take in case Nangoro would give me permission to proceed. It was certainly with regret, yet still with a feeling of relief, as putting an end to my indecision, that a message was at length received from Nangoro, prohibiting me from proceeding farther. If I had been in a condition to temporize, I have no doubt that I could have persuaded him to let me proceed, but that was now out of the question, and I therefore took leave and returned. Fortune now favoured me in many ways. I found my waggon mended, a sufficiency of cattle bought, and obtaining a guide, returned by a good road up the Omoramba without much difficulty, except in having nearly every day to dig or to clear out wells, which fully employed my whole party, now consisting of thirty-four people.

Returning to our starting point, Barmen, I will next describe the route which I followed to the eastwards, and which is very interesting, as it presents a peculiarly easy and open highway to the interior, and one practicable at almost all times for waggons, though indeed I—travelling at the driest time of an unusually dry year, one in which many of the Damara cattle perished of thirst, even at their own cattle posts—failed in reaching Lake Ngami. Proceeding up a small, but frequently running, river-course, a tributary of the Swakop, to Eikhams, and thence by a well-made Hottentot waggon road, over a very broken and arid country, we ascend out of the valley, keeping the high ridge of Awass to the right hand. We are now upon an elevated open plain, presenting no difficulties whatever to waggons if we follow the course of the Kuyip, but the ground that borders the upper part of the Noosop, by which I went, is very rugged and thorny. There is far more water to be got all about here than in Damara-land, but this being at present the border country between the Hottentots and Damaras, the wells were not generally opened. From Kurriknop eastwards no anxiety need be felt for food, as there is plenty of game, though the animals are exceedingly shy. The ground is sandy and undulating. Proceeding on, we get to Elephant Fountain, beyond which there are no peaked hills, nor landmarks, in fact, that could be laid down in the map, and thence recognised by a future traveller. Elephant Fountain had been a Wesleyan missionary station, but was abandoned for the double reason of being subject to fever from April to June, as well as from its vicinity to some

warlike Damara tribes. There is nothing in the appearance of Elephant Fountain that would suggest an idea of unhealthiness; it possesses, indeed, no peculiar feature, but it stands well on a barren and thorny hill; the—here contracted—bed of the Swart River is below, and there is a small, clear spring, which supplies water. Most fearful attacks of fever have year after year been experienced at the place, but not, so far as I could learn, anywhere else in the immediate neighbourhood. At Elephant Fountain I left my waggon, and rode on with a Hottentot chief, Amiral, and about forty of his men, to the eastwards. They had lately explored a long limestone ridge of hills that extends some 50 miles from T'was, and which is greatly intersected by water-courses, headed by springs, and along which we went. It appears to be of about 20 miles breadth, and attains a height of at least 1000 feet above the general level of the country. I consider it quite as a natural boundary between the thorny country of Damara-land and the broad, sandy, and wooded tracts of Central Africa. I contrived to get Bushmen guides to take us and about half of Amiral's party to T'ounobis, which we reached after a journey most trying to the oxen. The road passed by many large but dried up vleys; the ground was sufficiently hard, and would at ordinary seasons afford an excellent road for waggons, which after leaving T'was should pass not on the top of the ridge, as I did, but skirt it in the plain. T'ounobis is a fountain in a river-course, sufficient to supply any quantity of cattle, where I remained a week recruiting my oxen, of which I had barely sufficient to carry me back. I found a large village of Bushmen there, from whom I received much information concerning the lake and the country ahead. The land in front, up to its very borders, was described as being exactly the same as that we had now traversed. Hard sand, with plenty of trees, but not so thickly overgrown as to form any obstacle to a waggon, and growing but very few thorns,—indeed, I had great difficulty in getting thorn-bushes, of which to make my sheep kraals. So far then as T'ounobis I can guarantee the road from Walfisch Bay towards the interior to be perfectly open at any season of the year, and, except in the driest of times, from T'ounobis onwards. T'ounobis was passed by the Kubabees Hottentots in 1850. They had come upwards along the Unak Desert on a plundering and shooting excursion, with horses and oxen in great numbers to ride on. They had also built shooting-huts by the waterside, which I used, and had left other tokens of their passage. At T'ounobis they obtained a guide, whom I saw, and from whom I received much information, and under his escort they reached the lake.

A perfectly marvellous quantity of game congregated here;

deep pools of water that were supplied by a fountain were drunk dry every night, and I therefore more readily believed in the constant assertions of the Bushmen, that there was then no water whatever for a distance twice as great as that over which we had travelled ahead.

Having now described briefly the geography of those parts that I visited, I will next state what I learnt from various natives respecting the countries ahead of me.

At Tounobis I received the fullest description from the Bushmen natives of a lake called by them Il' Annee, which they often visited, and which I now feel assured to be Lake 'Ngami. It had been reached thence from Tounobis by the party of Kubabees Hottentots, that I mentioned above, in 7 days in August 1850, and the direction of its nearest point was uniformly stated to lie thence N. 50 E. true (N. 75 E. compass). The chiefs of the black tribes at that point were Maharaquè and Tworrathabè, names which are identified by Mr. Oswell as being those of the chiefs of the Maclumina on the S.W. of the lake. The distance represented by 7 days' journey in these parts would be pretty nearly 120 geographical miles measured straight, certainly between the wide limits of 100 and 140 miles.

I also heard much of a large river whose "lay" was N.N.W., and which joined the lake. This evidently is the Tso, but it was described to me as being called the Beribè (in Sirchuana), and as the T'guain Ti' Obo (in Hottentot). As regards the course of this river I was assured that it ran out of, and not into, the lake, but my information was not such as to withstand the more immediate testimony of Mr. Oswell, corroborated strongly as it is by the general features of the country.

This river, the Beribè (or Tso), was stated to pass entirely through the country of the adjacent tribes, and far in a N.N.W. direction to the other side of them. A much smaller stream S. of the Beribè, and having the same general course, was described as joining it just where it met the lake. This last streamlet, the Malopo (in Hottentot the T'kains), on which there are no boats, is separated during its course from the Beribè by a range of hilly country, called by the Hottentots the T'dèba. The Omoramba, at a distance of about 90 miles easterly from Omanbondé, meets another dry river-bed, and the two together ultimately reach some large water, but which I do not think to be the Malopo. It appears to be stagnant or nearly so, but I received very contradictory information about it; the large river (the Beribè) is beyond it. The Omoramba at about 60 miles from Omanbondé passes through a very hilly country, which, as far as I could make out, was continuous with the T'dèba. I have mentioned that hippopotami have constantly made their appearance at Omanbondé

when there was water there; this is a sure proof that the Omoramba cannot be entirely lost in the plain, but must join a large water, some such as I have mentioned. About the lower part of the Omoramba a peculiar race of negroes (the Soun Damnp) live, and extend very far to the northward. I shall refer to them again later; they were described as living N. 15 E. true from Tounobis.

My Ovampo information refers to a large river that runs from E. to W., and which is 4 quick or 5 easier days' march (say 100 miles due N.) from Nangoro's werft. It is a broad, swift-flowing stream, to the border of which Portuguese traders come and traffic. The ferry, which is chiefly used by the Ovampo, lies N. 19 E. by compass, or N. 7 W. true, from Nangoro's werft in Ondonga, and is near the junction of the two streams which principally form this river. One of these, the larger, comes from the very far E., the other from the S.E. and from the Mationa country; Mationa being the name given both by the Ovampo and Damaras to the tribes living on the Beribè, including those belonging to the chiefs whose names I have already mentioned. The Cunene was said to run into this river, but of its point of confluence I am not satisfied. Mr. Oswell informs me that he had always conceived an idea, from what the natives told him, that the Tso was in some way connected in the far N. with a large river running to the W. The Mationa river, mentioned above, may be this link. Where the embouchure of the Ovampo river may be I have no idea, but I have many reasons for thinking it not to be the Nourse. The captains of coasting-traders in those parts assured me that the Nourse is a periodical water-course, while I learnt from the same and other authorities that a constant river of considerable size, though small at its actual mouth, flows into Little Fish Bay (Mosammedes). There is now a thriving settlement there, where a Frenchman has long resided, who is said to make distant trading journeys into the interior. It would be very desirable for any officers of the slave squadron, or others who might land at that port, to make inquiries about the lower part of this stream, which must be perfectly well known there. The Ovampo told me that it seldom ran quite into the sea, but ended in a large deep pool close by the coast, beyond which the sand was dangerous to walk over, as it was a quicksand.

There is also a Portuguese trading station on the river opposite the country of the Onganjera; this cannot be far from the coast, for the caravan from Damara-land to that nation leaves Omaruru and travels northwards for a long way over some very high land frequently in view of the sea. From the mouth of the river a kind of sea-shell, much prized, and called by the natives Ombou,

is frequently brought. As regards the size of this river it is said to be such, that when a man calls across it his voice can be heard, but not his words. Opposite to the Ovampo it is extremely swift (boats cannot paddle up it) and very deep. It appears to be a most interesting river, and well worth exploring. I can say nothing as regards its salubrity, except that Ovampo-land appeared a remarkably healthy country, and Dainara-land I know is such. Corn land extends the whole way S. of it from Ovampo-land to very near the sea. Between the two confluent of the river the Ovaluntja live. Their country is described as very marshy, and many of their houses are built on poles: of course fever is to be dreaded there.

Ethnology.—I will now pass on to the distribution of tribes in this part of South Africa. Their history is not a little involved; but they may be enumerated thus:—1. The Ovampo are corn-growing tribes to the north, who, considered as blacks, are a highly civilized people, and one with strong local attachments, well ordered, honest, laborious, and neat, yet still with much of the negro in them. 2. The Damaras are a vagabond, lazy, thieving, pastoral race. 3. The Hottentots to the south are too well known to require further comment. 4. The Mationa Caffres to the east; and lastly, 5, the Bushman Hottentots and others, who lead a Bushman's life in the barren tracts, that separate these larger nations.

The Namaqua Hottentot is an invader of the last few years, but the Bushmen have not even a tradition of another home. Living with them are outcast Damaras, and also a very peculiar race of negroes speaking the Hottentot tongue, and that only. These have no traditions indicating their descent, and are found as far south as Bethany. They live peculiarly on the hills, and have puzzled ethnologists ever since they were first described. They call themselves Ghou Damup, and in Sir James Alexander's work and in missionary publications, are described as the Damaras of the hills. With the Damaras, however, they have nothing in common. Their features, shape, customs, and aptitudes indicate an entirely different origin, and it will be seen that an enquiry into their earlier history throws great light upon the former state of this country. The Mationa are Bechuannas, among whom, partly as slaves and partly independent, live the Soum Damup, a tribe kindred to the Ghou Damup in every respect, language, appearance, and superstitions.

To make the matter clearer I will state the results of frequent enquiries from many independent sources, the agreement in which is very striking.

About 70 years ago (certainly between 65 and 75 years), and when, from uniform testimony, water was much more abundant

than it is now, the Damaras lived in the Kaoko alone. The Ovampo were within their present frontier, but the Mationa extended to Ovampantieru-land, certainly far to the westward of Otchombindé, and all between these and down to the Orange River, lived Hottentots of various tribes. The Nareneen lived by the sea, and the Ounip (called by the Dutch Toppners) about the parts of which we are now speaking, and south of these were the Keikouka, now represented by the red people, by Swartboy, the Kubabees, and Blondel Swartz. Near to the Orange River the tribes were more numerous and more civilized, from their neighbourhood to the Dutch. They had a few guns, sometimes waggons and so forth, and these were the ancestors of Jonker, Amimals, Jan Boys, and other smaller tribes, as Buchess' and Fransman's. There was also a certain admixture of bastard blood in these last, who came to be designated Oerlams (a term of half reproach) by the Dutch, and to be disavowed by the Keikouka as partly aliens. Hence a jealousy arose, and still exists, between the two great divisions of the more southern Hottentots, the Keikouka and the Oerlams, who together are usually called in the aggregate "Namaquas," in contradistinction to the northerly tribes of Bushmen.

Interspersed among the Hottentots from the north to the south were the Ghou Damup, who were invariably considered as slaves and a good deal ill-used; they lived, when in communities, in the hills, or table-mountains, of which there are many, such as Omuvareoom, Konati, Keijo, Erongo, and many others, of which I have often heard, more to the south and west. Two movements now began to take place; first the Damaras, pressed for room or for some other cause, made an irruption to the eastwards, and spread over the country as far as Otchombindé, almost exterminating the Hottentots in their way and driving back the Mationa, while the Ghou Damup were pretty safe in their mountain-fortresses and received but little harm. The Toppners, however, not being at that time accustomed to the mountain-passes with which the Ghou Damup were familiar, were, as I said, greatly cut off. And it is curious, that within very late times (about eight years ago), exactly the same thing occurred to the Nareneen living west of the Kaoko.

The more northerly Toppners were thus quite cut off from all communication with those about Walfisch Bay, and remain so to the present time. There exists, however, the greatest fondness for traditional stories among these people, and I found the liveliest interest expressed on my return from the north relative to the well-being of those Hottentots whom I met among the Ovampo, and of whom scanty information only had been received from time to time. In Sir James Alexander's work mention will be found of the Navces, or Nabees, as he spells it, on information

received among the Hottentots. These are the Ovampo; Navees being the Hottentot name for them.

We have seen thus how the Damaras drove the Toppners to the same places as the Ghou Damup. Community of misfortune is gradually destroying the feeling of difference of race between them, so that intermarriage, which would have been quite unheard of in former years, is now becoming common. The Hottentots told me that 10 years ago it was quite unknown; and I have never seen any but children of the mixed race.

The Mationa made at various times reprisals on the Damaras; the last being about 20 years ago, when the Mationa came up the Epukiro River, while on a previous occasion they had passed up the Omoramba.

From the Damara invasion we now come to that of the Namaquas, which dates at a much later period, and in which Jonker Africamer played the principal part. Of all the particulars of this I have the fullest information; but I cannot expect that an interest which depends chiefly on persons and parties in South Africa, will be felt here; suffice it, therefore, to say, that by gradual encroachment the tribes, whose names you see here mentioned, strengthened and formed themselves, and plundered all before them. Sometimes they went on a professed national feeling to aid the Toppners, sometimes on none at all. In every case, however, the Toppners were thoroughly victimised; and it is only of late, when the Narencen had obtained so many guns and so much ammunition from whalers and guano ships, that they acquired sufficient strength to be recognised as others than simply as Bushmen by the Namaquas.

The moment that I saw the Ovampo I was most strongly impressed with the national identity of the Ghou Damup; it is true that the latter are most squalid and thievish, very strikingly opposite characteristics to those of the Ovampo, but on the other hand we cannot forget that they must have been an outcast race for ages, to have so completely lost, not only their own language, but all traditions of it. They dig and plant, which neither the Hottentots nor the Damaras do; and on the other hand I was assured that the Soun Damup, who lived to the north, were the field labourers of the Mationa (the Hottentots call broad "soun" from them), and were exactly the same as the Ovampo, except in some trivial difference of dress, and that there, some spoke Ovampo, some Mationa, some Hottentot, and some all of these tongues.

I conclude, then, that the Ghou Damup were the real aborigines of the country S. of the Ovampo, that very long since the Hottentots invaded and entirely conquered them, and that they both together settled down into the condition in which I described them to be at the beginning of this account.

I may add that exactly the same process is now going on between the Namaquas and the Damaras, and probably one-half of the whole Damara population has already been enslaved or murdered by the Namaquas. Those that are made slaves are used as cattle-watchers; their children, as they grow up, learn Hottentot, and readily identify themselves with the habits of their masters, so that few generations will probably have passed before the Damara language will be obsolete among them, and they will have become a race affording an exact parallel to that of the Ghou Damup. The Namaquas are still pressing on with the peculiar restlessness and obstinacy of the race, a belief in their destiny, a scorn of blacks, and a fondness for plunder, which has already led them from the Orange river, and which now seems to be more marked than ever. As unarmed savages can never resist their guns, which number between 3000 and 4000, my belief is that not many years will have elapsed before they will have utterly destroyed the Damaras, and will come into direct conflict both with the Ovampo and the Mationa.

On the habits of the Damaras I have little to say. Physically speaking they are a striking race, with an appearance of strength, lightness, and daring that is highly imposing. They are tall, upright, and often remarkably handsome men, models for sculptors. They have a fair facial angle of about 70° ; fine, manly, open countenances, and often beautifully chiselled features; but morally they are the most worthless, thieving, and murderous of vagabonds, and at the least irritation their usually placid countenance changes into one of the most diabolical expression. Much struck as I was with them at first, I came ultimately to the conclusion that, except their general good humour, there was not a single good point in their character. Their very personal strength is wonderfully small considering their immense muscular development. Often as I have had trials in lifting weights and so forth among them, I never found one who was anything like a match for the average of my own men. Idea of a Supreme Being they have none; but ceremonies and superstitions innumerable; none of which have anything poetical in their character. They are chiefly shown in smearing with fat and with cow-dung and in abstaining from eating cattle with certain marks, different according to the family they descend from; of the fetich superstition there is no trace. A tree is supposed to be the universal progenitor, two of which divide the honour, one at Omaruru, the other on the road to the Ovampo. All the men are circumcised.

They have no government; any man with 20 cows calls himself an independent captain. They are devoid of all national or social ties to a perfectly marvellous degree. If one werft is plundered, the adjacent ones rarely rise to defend it, and thus the Namaquas have destroyed or enslaved piecemeal about one-half

of the whole Damara population. As to the language, a very complete grammar and dictionary has been compiled by the Rhenish Missionaries, and sent last year to the Professor of Philology at Bonn, who will, I believe, shortly publish it.

Very different from these in every respect are the Ovampo, who are orderly, centralised, hard-working, neat, and scrupulously honest. Ondonga is plotted out into small, well-farmed holdings of corn and pasturage, each occupied by a family, generally the grandfather, son, and children. Every one here has the appearance of plenty, and none of the squalid, wretched, uncared-for, old people, so painfully common among the Damaras, are to be found amongst them. The King, Nangoro, is despotic, and seems to rule with a patriarchal sway. Laws against theft are peculiarly severe. The tribute to the King is small, and paid by a per centage on the tobacco grown, and *not on the corn*. The marriage tie is extremely lax. The Ovampo possess the entire carrying trade between the Damaras and the Portuguese.

My map is for all practical purposes, and so far as it professes to go, very fairly accurate. I am not aware that any isolated hill is left out, though I do not profess to give the peaks in each group. I should have been involved in endless confusion, had I attempted so much. The limits however of all hills and all groups of hills are taken. I triangulated chiefly with an azimuth compass, from Walfisch Bay onwards as far as there were mountains to triangulate by, that is to Otchikoto on the N., and to Elephant Fountain on the E. I have so great a number of bearings, that I have had no difficulty in making many independent series of triangles, and checking one by the other. I thus pretty easily found out such errors, either of reading off observations, of mistaking hills, or of writing them wrongly down, which I saw in spite of all my care would occasionally occur. I then selected the series of triangles that I thought would give the most trustworthy result, guided by the size of the angles, and more particularly by the definiteness of the mountain peaks that I observed, and then protracted them. Having done this, and registered the longitudes which this triangulation gave for my three main stations, Barmen, Okamatuti, and Elephant Fountain (assuming the longitude of Pelican Point, Walfisch Bay, at $14^{\circ} 21' 3''$, and determining the scale of the map by differences of latitude), I compared these longitudes with those deduced astronomically, and I am glad to say that the agreement is very satisfactory. There is an abstract of all this at the end of the paper. Some grave error had affected my instrument, so that although the observations in each group agree extremely well together, yet there is a wide difference between the longitudes derived from these several groups. I had, however, done my best when taking lunars, say E., to take others W. under as nearly as possible the same circumstances, both of altitudes and of distances, as I could, and of the same bodies also. With sun observations I used one coloured glass, and always the same one, toning the instrument of course as required. I also examined the adjustments of my sextant with all the care I could, previously to beginning to observe; and it is solely from having taken these precautions with great pains that I can account for the excellent agreement of the mean longitudes (deduced as they are from such wide extremes) with that obtained by triangulation. As regards T'ouachis and Ondonga the lunars were taken with a good, though small, and not clearly divided circle, which had to be read off by firelight; still the results of the former are very fair, and those of the latter, being checked by the position of Otchikoto, will answer sufficiently well. I am thus particular upon these matters, as it is of course a satisfactory thing to have well determined the geography of a new country, even though only in outline, for it may save much trouble and doubts to future travellers. I have altogether determined astronomically the longitudes of 6, and the latitudes of 53 stations, and I had no object in taking more.

TABLE OF LATITUDES OBSERVED.

Places of Observations.	The Number of Bottles observed.		Latitudes.		
	N.	S.	°	'	"
Sand Fountain	1	1	22	57	57
Scheppmansdorp					
Hycomkop	2	..	22	41	45
Oosop	3	2	22	45	38
Davieep	1	..	22	48	0
Annas	1	..	22	43	0
Mouth of Tsobis River	1	..	22	26	3
Tsobis	1	..	22	30	55
Kurrikoop (on Swakop)	2	1	22	23	2
Otjimbiunguè	2	..	22	21	50
Barmen	2	1	22	7	7
Schmelen's Hope	1	1	21	59	34
Okaudu	1	..	21	56	30
Katjamakompè	2	..			
Okanjòè	1	..	21	27	0
On leaving the Omoramba	1	..	21	13	29
Otjikoruruniè	1	1	21	5	54
Outekeremba	1	..	21	1	49
Ozukaro	1	..	20	40	57
Near Ja Kahaca	3	..	20	38	50
Otjironjuba	1	..	20	32	25
July 16th, Omoramba	1	1	20	29	45
April 1st, Werft	2	..	20	22	15
July 14th, Omoramba	1	..	20	18	43
Okavardè	2	1	20	6	37
Omanbondè	1	1	20	2	30
On Flat, April 12th . . . . .	..	1	20	1	5
Okatjokeama S. Vley	1	2	19	57	15
" N. Vley	1	2	19	55	35
Okapakua . . . . .	..	1	19	47	4
Okumabuli	many		19	30	48
Omutienkandè	1	1	19	25	50
At foot of hills, April 30th	1	..	19	20	13
Otehikoto . . . . .	..	2	19	10	0
Otjando . . . . .	..	1	18	58	13
Small well . . . . .	..	1	18	54	37
Omutchamatunda . . . . .	..	2	18	47	32
South border of Flat . . . . .	..	1	18	31	51
Two miles within Ondonga	1	..	18	6	41
Nangoro's Werft . . . . .	..	1	17	58	40
Barmen Cattle post	1	..	22	15	55
Due E. of High Peak	2	1	22	14	36
Katjimasha's Kraal	1	..	22	26	0
Eikham	3	..	22	34	40
On plain, Sept. 3rd	1	..	22	27	4
On Noosop R., Sept. 3th	1	..	22	16	11
Elephant Fountain	2	..	22	27	15
Twas	2	..	22	36	18
Kurrikoop (on Noosop)	1	..	22	25	31
Occultation-place . . . . .	..	1	22	37	35
Near Okomavaka	1	1	22	15	20
On road to Tounobis	1	1	22	7	35
Tounobis	2	1	21	54	40

LUNARS taken with Sextant.—Calculations by Mr. Burnwood, Hydr. Off.

	Identifying Letter in Calculations.	Body observed.	East or West of Moon.	Proximate Altitude of Sun or Star.	Proximate Altitude of Moon.	Proximate Distance.	Longitudes deduced.	Identifying Letter of Triangle.	Means.	Longitude by means of East and West.	Longitude by Triangulation alone, using $14^{\circ} 52' 5''$ as longitude of Pelican Point.	Difference.	Longitude used in Map.	Stars omitted as being evidently bad ones.						
Elephant Fountain.	a	Saturn	W.	33 42	90	10	19 13.3	A	19 16.3	19 13.7	19 15.5	+1.2	19 39	a						
	b			37 44			19 11.7													
	c			39 52			19 17.9													
	d			31 03			19 16.7													
	e			31 57			19 16.0													
	f	Sun	E.	30 33	83	106	19 12.7	B							but if calculated according to method mentioned in the note we have					
	g			25 28			18 24.5													
	h			26 28			18 30.2													
	i			29 58			18 30.2													
	j			32 33			18 38.5													
Schmelen's Hope.	k	Saturn	E.	37 30	122	10	15 28	C	16 35	16 35.0	16 36.5	+1'	16 56.5	k						
	l			38 12			16 27.7													
	m			40 17			16 17.5													
	n			40 16			16 30.2													
	o	Sun	W.	34 20	119	94	17 32.5	D												
	p			33 31			17 17.3													
	q			33 23			17 19.7													
	r			31 23			17 14.2													
	s			44 41			17 37.5													
	Okamebat.	t	Saturn	E.	30 40	94	109	17 31							E	18 30	18 33	18 30	-3	18 20	t
u		30 50			17 29															
v		28 57			17 35.5															
w		31 32			14 28.5															
x		34 28			16 1.7															
y		Sun	W.	36 33	17 55.5															
z				28 39	18 44.5															
aa				25 40	18 53.7															
ab				24 41	18 39.2															
ac				23 47	18 46															
Occulta- tion, 37 m. W. of Ele- phant Fountain.	18 7.7	18 9	-1.3	18 8	..						

It is evident that the mean of these E. and W. observations cannot be expected to give the true longitude of Elephant Fountain; because the circumstances under which they were actually taken, both as regards the altitudes of the bodies and their distances, in no way match together. If we choose we can reject them entirely, and trust only to the assistance of the calculated result of the occultation with that obtained by triangulating, to corroborate the correctness of the latter method as regards the position of places in this part of the journey. Or else, as the observations C and D were taken under very similar circumstances to the whole of those at Schmelen's Hope and Okamebat, we can find the error which, whatever its cause may be, was found in practice to affect the results of these observations; and then, by applying this error to the longitudes as obtained from C and D, we might to obtain a much more trustworthy approximation than before to the true longitude of Elephant Fountain. Thus—

	Okamebat.	Schmelen's Hope.
East Observations	16 5	16 55
West ..	16 50.4	17 14
Difference	45.4	11
Error ..	73	30.5

or, 28" = the mean error. Now, the mean of C and D is $18^{\circ} 31' 3''$; and this $+ 28'' = 18^{\circ} 59' 3''$, which differs only 6.5 from $18^{\circ} 59'$, which was the longitude obtained by triangulation from Wallich Bay.

flow of the Zouga may have had something to do in the matter. Beyond the salt-pans the country is perfectly level and hard, and covered with Mopané and Baobob trees, the underlying rock being white tufa, in which a great number of springs of good water are found. These, from their number and proximity, are called 'Matlomaganyana,' or the 'links,' as of a chain. A considerable population of Bushmen live in their vicinity, under the sway of Sekhami. They are remarkably unlike their more southern brethren, though speaking a dialect of the same language and bearing the same name. They are fine, tall, strapping fellows, and nearly as black as the Caffres, and are also the most daring Bushmen in the country, frequently killing the elephant both by day and during moonlight nights. The entire Bushman nation, as scattered over the Kalahari desert around and westwards of the Lake, and likewise in the regions to the N. of that, must be very large. The theory that Bushmen are Hottentots, driven to their present position and habits by the encroachments of the whites, receives no confirmation from any tradition existing among themselves, nor from the actual and immemorial condition of the more distant hordes.

Around the wells, and indeed through the whole region upon which we had now entered, a tree called *Mopané* abounds. The leaf is peculiar in shape, and affords shelter to myriads of a little insect not larger than the head of a common pin. The dwellings of these little colonists are in shape like a limpet-shell, and though each is only large enough to hold its little owner, so many exist on one leaf that, being of a sweet, gummy substance, the natives collect them in large quantities for food. The country between the Matlomaganyana and the Mababi was the worst we had seen in Africa. The drought was excessive; not a bird or an insect disturbed the stillness of death which reigned over the scene. All around was one level of low scrub, Mohonono bush, and Mopané trees. Our Bushman guide seemed to wander, or only follow the tracks of elephants made when going from one Mohonono bush to another, which, however, on the morning of the fourth day disappeared altogether. Having come at length upon a rhinoceros trail, we allowed the cattle, which were nearly worn out by the deep dry sands through which we had passed, to run along it until their instinct led them to the water, unfortunately, however, at a part of the Mababi infested by the 'Tsetse' fly. We were unfeignedly thankful to find ourselves on the banks of this river, as it is a branch of the Tsö flowing to the E.N.E. Bakoba-Bushmen and Banajoa villages we found on its banks, the inhabitants deriving subsistence from a root called 'tsitla' when their crops fail. The Banajoa huts are built with a kind of second story, the upper being the sleeping place. A fire is placed

under it in order that the occupants may get rid of their troublesome tormentors, the mosquitoes, by means of the smoke. Chombo, the head man of the Banajoa village, became our guide to Sebitoané, and led us through the reedy swamp, about 10 miles broad, on which his village is situated, and across the river Souta by night, on account of it being infested by the 'tsetse,' and early on the morning of the 19th of June we found ourselves on the banks of the Chobé. As circumstances led to our remaining on this spot, in lat. $18^{\circ} 20' S.$, and long. $26^{\circ} E.$, for more than two months, and the hopes which Mr. Oswell and I then entertained are not entirely extinguished, I may be excused entering a little into detail.

Sebitoané, the great chief of this large territory, was one of a horde of Mantatees, which in 1824 threatened to destroy Lattakoo and invade the colony. Driven back by the Griquas he fled towards the north, and fighting his way through the countries of the Bawanketsé, Bakwain, and Bamangwato, he followed nearly the same route as our own to the Zouga. Having plundered the Bakoba and Botlétli, living on that river, he next crossed over the desert between Lake 'Ngami and the Damaras, to the west. Scarcity of water and the bravery of the Damaras obliged him, however, to retrace his steps much poorer in cattle than upon his arrival. Proceeding up the Tamunaklé, he conquered the black races inhabiting the rivers Chobé, Seshéké, &c., and at last established himself on an island, said to have been formed artificially by Senaturn, a chief of the Borotse. Having been informed of the efforts made in vain by Mr. Oswell and myself to penetrate into his country, he evinced great anxiety to open up a path for us, and not only sent men to search for us along the Zouga, but made considerable presents of cattle to different chiefs on the way, with the request that they would render us every assistance in their power, and furnish us with guides. He even came nearly 360 miles southwards, and would have come further, in order to be near to us and to English traders. When we met he seemed overjoyed, and having remarked that our cattle had been bitten by the fly and would certainly die, said, "Never mind; I have plenty, and will give you as many as you need." He then appeared anxious to remove us to the N., or the safe side of the Chobé, and also to be near his town of Linyanti; but when he saw that our waggons were too large for his canoes, he ordered the people of the town to remove to our resting-place. A few days afterwards, however, and when the new village was quickly springing up, he became ill, and, after lingering a fortnight, to our great regret died. His people received our condolence and advice in a friendly manner, and requested us not to leave them, but treat his children as we

should have done had Sebítóané been still alive. His daughter, Mamochishane, who succeeded him in the chieftainship, being still at the head town of the Borotse, a distance of 12 days, or nearly 200 miles, from the waggons, double that time was required to open up a communication with her. She was reported to be in childbed at the time, but sent the chief next in authority to herself to visit us on her behalf. His instructions were to treat us as kindly as if her father were still alive, and full permission was granted for us to proceed wherever we wished to go. We then rode about 100 miles on horseback to the N.E., and were well rewarded by a sight of the great river called Seshéké, in lat. $17^{\circ} 28' S.$ A variety of considerations, all of which we had previously weighed, induced us on our return to the waggons to decide on starting for the Cape. On our return we went along the Mababi and Tammakle, and after crossing the Zouga fell in with our old road to the Lake.*

Before detailing the information which our two months' sojourn on the Chobé enabled us to collect, I may remark that the opening up of a path from either the E. or the W. coast to the centre of the continent—a prominent feature in all our plans—would be a worthy subject for the consideration of the Royal Geographical Society; and for such an undertaking I know no one better suited than my friend Mr. Oswell. He has courage and prudence equal to any emergency, and possesses, moreover, that qualification, so indispensable in a traveller, of gaining the confidence of the natives, while maintaining the dignity of a gentleman.

The following information, derived partly from the natives, who came in great numbers to see the white strangers, and partly from our own observation, will prove of service to any one who may wish to visit the country. The extensive region to the N., N.E., and N.W. of the Chobé and Seshéké rivers, which owned the sway of the late Sebítóané, and is now governed by the Makololo (Quilolo = Captain?), in name of his daughter, is for hundreds of miles nearly a dead level. In passing along 100 miles from the part where our waggons stood on the Chobé to the river Seshéké, we saw no rise higher than an ant-hill. The country is intersected by numerous deep rivers, and, adjacent to each of these, immense reedy bogs or swamps stretch away in almost every direction. Oxen cannot pass through these swamps, but sink in; and, on looking down into the holes thus made, the parts immediately under the surface are seen to be filled with water. These rivers are not like many which bear the

* Mr. Oswell informs me that "the country which owned Sebítóané's sway (now his daughter's) is very large. Eighty-two tribes or principal towns paid him tribute, and his influence may be said to have extended over a circle of 800 to 1000 miles."

name of such in South Africa, mere "nullahs," containing nothing but sand and stones: on the contrary, all those which came under our observation here contained large volumes of water, and that too flowing with considerable rapidity at the end of an extraordinarily dry season. Yet on sounding the Chobé we found it to have a regular depth of 15 feet on the side to which the water swung, and of 12 feet on the calm side. The banks below the lowest water-mark were nearly perpendicular, and the water was as deep, a foot from the bank, as in the middle of the stream; the roots of the reeds and coarse grass seeming to prevent it from wearing away the banks, which, however, in many parts are undermined and overhang the water. The lands in this region are raised only a few feet above the prevailing level, on which the people pasture their cattle, make their gardens, and build their towns. The rivers overflow their banks annually. The unusual drought of the season preceding our visit seems to have extended even to the sources of the waters. The Chobé ought to have overflowed in July, and the people ascribed the non-appearance of the waters to the death of their chief. But when the rivers do fill, the whole country is inundated, and must present the appearance of a vast lake, with numerous islands scattered over its surface. The numerous branches given off by each of the rivers, and the annual overflow of the country, explain the reports we had heard of "*Li-noka-noka*" (rivers on rivers), and "large waters" with many islands in them. The Chobé must rise 10 feet in perpendicular height before it can reach the dykes made for catching fish, which we observed about a mile from its banks; and the Seshéké must rise 16 to 20 feet perpendicularly before it overflows its banks; yet we saw unmistakeable evidences of its flood extending 15 miles out. The natives traverse the country in every direction in their canoes, and even visit their gardens in them, so that a boat will be indispensable in the equipments of future travellers.

The soil seemed fruitful, and is generally covered with rank, coarse grass; but many large and beautiful trees, most of which were to us entirely new, adorned the landscape. We claimed acquaintance, however, with the gigantic Baobab, which raises its enormous arms high above its companions, and makes them in contrast appear as mere bushes. We recognised also date-trees in large numbers, and also many palmyras. The date-trees were in blossom on the road to Seshéké at the time of our visit, and the seeds were observed below them. Of the new trees some were splendid evergreens, bearing edible fruits; and, in addition to parasitical plants of great size, we observed two of the Orchidean family. One beautiful fruit-bearing tree particularly attracted our attention, but unfortunately the seeds, about the size of peach-

stones, were all broken by some animal. The natives raise, besides their usual grains, considerable quantities of a bean which bears its pods underground. They are called "motu o hatsi" (earthman), and are sweet when roasted. They grow well at Kuruman, and may succeed at the Cape. The people of the Borotse tribe cultivate the sugar-cane and sweet potato. Wheat, maize, peach and apricot stones, and other garden seeds, have been left with the Makololo, as they spontaneously offered to make a garden for our use. The moisture from the rivers permeates the soil, rendering constant irrigation unnecessary; and some of the seeds left may vegetate and increase the food of the inhabitants, but of this indeed their stout and healthy appearance indicates no want.

We ascertained that the hilly parts beyond were without defence against the Matibele, and Mosilekatse constantly makes excursions against them, but their own deep, reedy rivers are safe against inroads.

Respecting the sources of these rivers we are quite in the dark. The Makololo have ascended the Seshéké, or, as it is otherwise called, the Borotse River, at least 400 miles above the town to which our journey extended. Its general course may be inferred from their statement, that, when ascending it, "the sun rose on one cheek and set on the other." But some, in drawing maps for us, gave it a little Westing. In lat. $17^{\circ} 21' S.$ it contains a volume of water of from 400 to 500 yards broad, and though we saw white banks of sand in it, the depth was evidently considerable. The name Seshéké refers to these banks of white sand. Alligators and hippopotami abound in it. A series of rapids, situated above the town of Seshéké, compels the boatmen to drag their canoes some distance along the shore, and at about 80 miles below the same point a waterfall is reported, the spray and noise arising from which are so considerable as to have led to the name "Mosi oa tunya" (smoke sounding). The spray is said to be visible 10 miles off. This waterfall may have prevented the slave-dealer from sailing up this river, which we believe to be the main branch of the Zambesi, for it is a fact to which all the natives bore uniform testimony, "that the slave-trade only began on the Seshéké in 1850." At the falls the river is narrowed by means of rocks. It soon, however, spreads out, and becomes placid again. The natives, who have been to the eastward, know of the Seshéké being joined by another river at about a month's distance from the town, which, beyond the junction, assumes the name Zambésa or Zambesi. The large river referred to is called the Bashukulompo or Maninche, but it is only 80 or 100 yards wide. A great many branches, as the Loï Lombé, 'Njoko, Majele, &c., connect the Maninche with the Seshéké. These are inserted in

the map as given by the natives, but even beyond the point where these streams empty themselves into it the Seshéké must be a large river, for Sennturu, the Borotse chief expelled by Sebitoané, built a large boat of planks sewn together, which was roofed in with white cloth, so that his people might see it at a great distance, and it required twenty men to paddle it. The best informed natives can give no information as to whence the supply of water comes which these rivers convey with considerable velocity to the E. The usual answer to our inquiries was, "The water comes from Lobale." And what is Lobale?—"The source of the waters." Lobala in Sichuana means a large plain without trees, but whether Lobale means an expanse (lake), or a province,* we could not determine. The Loena, Liambae, and Lonta are said to be large rivers, and the inhabitants possess many canoes. The Lonta contains light-coloured water, the Liambae clear water, and both flow for some distance in the same channel after their junction, side by side and unmixed. The water of the Seshéké is hard but clear, and does not readily form a lather with soap. The water of the Chobé is clear, and as soft as that of the Zouga. The Tamunakle and the Teogé had their annual rise in June and July, while, as we had an opportunity of observing, the Chobé was unaffected, or rather fell slightly $1\frac{1}{2}$ inches during the same period. The sources of the Chobé and Zouga, &c., would therefore appear to be distinct. A good highway into a large section of this continent is now opened to our view, and any one may travel for hundreds of miles unmolested. The country around Libale is reported very swampy, or rather boggy, for people not unfrequently slip through the crust of earth which covers the underlying waters, and perish. Near to the hill Sorila on the Embarras a waterfall is reported, but the natives of the country oppose any path being made in that direction.

The people of these regions are black, totally distinct from the Bechuans. Those of Sebitoané are called Makololo. The black race which he found inhabiting the numerous islands consists of tribes of different names, as Borotse, Manyeti, Batoka, Bashukulompo, &c. Being the victorious party, the Sichuana is the language of the court. The Bible is being translated into that language, and Providence has prepared the way for it. Besides Sichuana there are the different dialects of the black race inhabiting the country, and though some of the radicles show them to be of the same family of languages as the Sichuana, none of the Bechuana could understand it. To judge from a comparison between 300 words of the Bayeyé or Bakoba, and about an equal

* Mr. Oswell thinks that there may be some connexion between the names of the R. Lobali and of the Portuguese province of Loyal or Loural to the N.W. of the Borotse.—Ed.

number from each of the following tribes, viz. the Bashubea, Borotse, Batoka, Banyetuka, Bamapanda, and Balajaze, with the Sichuana, the former bear about the same relation to the latter that provincial English does to broad Scotch. We found everywhere people who could understand us. These blacks designate the Supreme Being by the name of Nyampi or Reza, which latter is identical with the Oreeja of the Bayayé. The Borotse are very ingenious in basket-making and wood-work generally. The Banyeti are excellent smiths, making ox and sheep bells, spears, knives, needles, and hoes of superior workmanship. Iron of excellent quality abounds in their country, which they extract from the ore. They are famed as canoe-builders also, and the abundance of a light, strong kind of wood, called Molompi, enables them to excel in this branch of industry. Other tribes are famed for their skill in pottery; their country yields abundance of native produce; but though they are stoutly made, especially their upper extremities, they seem never to have been addicted to war, but appear to have trusted to the defences which their deep, reedy rivers afford to their numerous populations. In constructing the rough sketch of their country only the largest towns are given. Scores of the people were employed by Mr. Oswell and myself at different times, and as their accounts generally agree, we consider that we give an approximation to the truth. The size of the towns, as indicated in their drawings, derives additional confirmation from the fact that in our ride to Seshéké we saw several villages of from 300 to 500 inhabitants each, which were not enumerated by our informants, being in their estimation too small to mention. The Batoka and Bashukulompo follow the curious custom of knocking out the upper front teeth at the age of puberty; the lower incisors, being relieved from the pressure of the upper, become long and press out the lower lip, while the upper lip falling in, gives to the countenance a sort of gaberlunzie appearance. European manufactures in considerable quantities find their way from both E. and W. coasts to the centre of the continent. We were amused soon after our arrival at the Chobé by seeing a black gentleman walk towards us in a gaudily-coloured dressing-gown, and many of the Makololo possessed cloaks of blue, green, and red baize, or of different coloured prints. On inquiry we found that most of these had been obtained in exchange for slaves, and that the traffic begun on the Seshéké only in 1850. A party of an African tribe called Mambari visited Sebitoané during that year with considerable quantities of English manufactured cloth, and a few old Portuguese guns, marked "Legitimo de braga," and they refused everything in exchange except boys of about fourteen years of age. The Makololo viewed the traffic with dislike, but having great numbers of the

black race living in subjection to them, they were too easily persuaded to give these for the guns. Eight of these old, useless instruments were purchased by Sebitoané for as many boys. They then incited the Makololo to go on a razzia against the Bashukulompo, stipulating beforehand that, in consideration for the use to be made of their guns in the attack on the tribe, they should receive all the captured slaves, while they, the Makololo, should have all the cattle. While on this expedition the Makololo met some Portuguese, or bastard Portuguese, slave-dealers on the Bashukulompo or Maninche river. They were said to be as white as we were (our complexion being then a shade or two deeper than wash-leather), and they had straight but short hair. These traders presented three English muskets to the Makololo in exchange for about thirty captives. The Mambari went off to the N.W. with about 200 slaves, the other party towards the E. coast, but both were so well pleased with their new customers as to promise to return in 1851. The Mambari are said to live in the vicinity of the sea to the W. The other party came up to the Zambesi from the sea on the E. If traders from Europe would come up the Zambesi, the slave-dealer might soon be driven out of the market.

We were informed of the existence of a large water or lake called Sebotemokoa, in the direction usually given as that of Lake Maravi (Tanganna?). Many slaves come from that quarter, and the goods employed in the traffic probably go up the Zambesi. Can English traders not equal slave-dealers in enterprise? Any party possessing sufficient energy would reap abundantly, for since we opened up a way to the river Zouga, considerable profits have been made. We know of 900 elephants having been killed on the Zouga in the space of three years, and previous to our arrival no use whatever was made of the ivory; but on the rivers indicated in my map arulets are made of the ivory, half an inch of which is lost in the process of making, the saw used being a quarter of an inch in diameter, and arulets of brass wire would be preferred by the natives. Tusks (called by the people "Marapshela" or bones) may even now be seen, completely spoiled by sun and rain, lying with the other bones of the animal. More than 10,000*l.* worth of ivory has been brought down to the colony from that river alone, and if the discovery of only one river has added so materially to the commerce of the colony, what may we not expect from the numerous populations which are now brought to light?*. But should European traders proceed into the new region, the blacks will be supplied with fire-arms, and give the

* Mr. Moffatt writes to the Rev. Dr. Tidman, "Of course Livingston has written to you fully, and you will see what an immense field for missions presents itself on the banks of the Zambesi among a teeming population speaking *Sichuana*."—*Ec.*

colonists much trouble afterwards. Can the trade in fire-arms be prevented? So long as, according to Cumming's account, 3000 per cent. can be made by the trade in arms, it is in vain to attempt to stop it. The result, however, of all our observations in this matter is, that the introduction of fire-arms among the blacks has produced the same effect as it did among the whites. It puts an end to most of their petty wars, and renders such as do occur much less bloody than they formerly were. Should any one be disposed to establish a trade on the Zambesi, let it be particularly borne in mind that June, July, and August are the only safe months we at present know. We arrived on the Chobé in July, and had frost, but the winter is very short. We observed swallows on the Seshéké in the beginning of August, and the trees, generally speaking, never lose their leaves.

The bite of the tsetse (fly) is fatal to nearly all domestic animals, yet, when allowed to settle on the hand, all it is observed to do is to insert its proboscis a little farther in than seems necessary to reach the blood. It then withdraws it a little, the proboscis assumes a crimson colour, the mandibles appear in operation, the shrunken body swells, and in a few seconds the animal becomes quite full and quietly leaves. Its size is almost that of the common blue fly which settles on meat, but the wings are longer. In the ox the following symptoms are produced by the bite of the insect:—The eye runs, the glands under the jaw swell, the coat loses its gloss, there is a peculiar flaccidity of the muscles generally, and emaciation commences, which proceeds unchecked until, perhaps months after the bite, purging supervenes, and the animal perishes of extreme exhaustion. Some die soon after the bite is inflicted, especially if they are in good condition or should rain fall, but in general the process of emaciation goes on for months. I had a horse which perished five months after being exposed to the insect.

When the animal is destroyed, in consequence of not being able to rise, the following appearances may be observed. The cellular tissue under the skin is injected with air, and the surface of the body presents the appearance of a number of soap-bubbles strewed over the carcase. The fat is of a greenish-yellow colour, and of oily consistence. The muscles are flabby and the heart frequently pale and softened. The lungs have diseased patches on their surface of a pink or grey colour, the liver is frequently diseased, and the gall bladder always distended with bile. The stomach presents no particular appearance, but the small intestines are pale and generally empty. The blood is remarkably small in quantity, and so devoid of colouring matter that it scarcely stains the hands. The poison seems to be of the nature of a ferment, capable of propagating itself, and acts principally on the brain,

heart, lungs, and liver. The brain seemed affected in several by the circulation of the morbid fluid, for the animal became unsteady in its gait and sometimes even blind. The tsetse is fatal only to domestic animals, as the wild feed in parts infested by it quite undisturbed. There are large tribes which cannot keep either cattle or sheep because the tsetse abounds in their country, yet it bites man and no danger follows. Our children lived for two months among the tsetse, and were frequently bitten, but suffered no harm, while we lost most of our best oxen after having been in contact with the fly on only one or two occasions. We have seen zebras, buffaloes, and antelopes feeding undisturbed in the vicinity of our waggons on the Chobé, quite unmolested by the tsetse which buzzed around them. Oxen and buffaloes, horses and zebras, antelopes and goats, jackals and dogs, possess somewhat of the same nature. What is there in domestication which renders domestic animals obnoxious to the poison? Is man not as much a domestic animal as a dog? Is it the tsetse at all which kills the animals? Captain Vardon, of the Indian army, decided this point, for he rode a horse up to a hill infested by tsetse, and in ten days his doubts were removed by the death of his horse. A curious feature in the case is, that dogs, though reared on milk, die if bitten, while calves are safe so long as they suck the cow. A dog, reared on the meat of game, may be hunted in tsetse districts in safety. The tsetse only inhabits particular localities well known to the natives. Is there any antiseptic in the fluids of game and man which does not exist in the fluids of tame animals, or in those of dogs reared on milk?

EXTRACT FROM A LETTER RECEIVED BY MR. OSWELL FROM MR. LIVINGSTON, DATED CAPE TOWN, APRIL 27, 1852.

"Captain Tuckey gives a vocabulary of the dialects on the River Zaire, and among many other words which we know, there stands staring at us Mokonja's favourite 'Mabotabota,' with very little alteration; and many of the 'Pria men' here know the parts mentioned in the Map in the fork of the Bashukulompo and Sesbéké rivers. They are also well acquainted with the Maninche or Bashukulompo."

Mrs. Livingston has since arrived in England with her children, her enterprising husband having proceeded again northwards upon two years' leave from the London Missionary Society, to explore still further the central portions of Africa.—*Ed.*

From Captain Parish, 45th Regt., at Winborg in the Sovereignty, March 6, 1852.

"I omitted in my map the lat. of Blomfontein, which I can get correctly from the Surveyor-General, Mr. Ford. I have just seen a map of the Basuto (Mossam's territory), published in Paris by the French mission, from the Notes of M. Dyke, a French missionary—it seems very well got up, and as far as I can judge, correctly drawn. Although the Missionary Maps are principally to show the boundaries of their Chiefs, they are the only ones on which many of the principal points are mentioned.

"Mr. Green is now staying with us in camp, having returned from an expedition to the Great Lake with Messrs. Shelley and Bushe. He is just starting again with some of my brother officers to shoot lions. He proposes returning towards the lake in April. All travelling in that part of the country is just now stopped by a disease which attacks the horses; even here they are dying of it every day. It seems epidemic, and carries them off very quickly. An animal, quite well in the morning, is dead before night: sometimes an hour or two after taken with it. It has the appearance of inflammation of the lungs, and is dreaded by the Boers and farmers as one of the worst scourges they are subject to."

XIII.—Proposal for a Rapid Communication with the Pacific and the East, via British North America. By Capt. M. H. SYNGE, R.E., F.R.G.S.*

Read Jan. 12 and 26, 1852.

THE proposed communication consists of component parts, each of which is in itself complete and independent, opening a new and distinct feature of the country, and forming separately a profitable and reproductive work. Each part is characterised by these distinctive features, and by marks of superiority over competing routes, similar to those which distinguish the entire proposed inter-oceanic communication. Every part of the chain may, therefore, rely on its intrinsic merits, and is capable of separate execution. That execution would, however, be the most profitable, and for every reason the most desirable, which would most speedily open the country and effect the communication the whole way to the Pacific.

An examination of the globe shows that the entire route, as connecting Europe with the Pacific and the East, is shorter in proportion as it is *northerly*. Thus one through the United States is shorter than one through Central America; and one through British America, shorter than one through the United States. Equal facilities existing for crossing the respective transcontinental portions of these routes, it necessarily follows that the shortest can also be most quickly traversed. These and other important advantages belong equally to the several parts which form the route through British America. The comparison presents the same result through every link and feature; but the detailed examination of vast tracts of country which it would require, involves so many points of physical, special, and political geography, that to be at all adequately dealt with they must be treated as separate, though subordinate and related subjects.*

* It must suffice briefly to remark that no route can be carried out within the United States by similar natural advantages. That which is universally allowed to be the best that could be formed there, is longer by the inferior position of the Atlantic seaboard within their territories, and extends to the same termination of

With regard to the British route, beginning at the East, railroads throughout the provinces of Nova Scotia and New Brunswick, to connect the ports of the seaboard with the interior, are essential to the success of the new portion of the route: they would be the means of turning the tide of emigration, labour, and commerce, and would at once demonstrate the superior position of the British territory. The present high development of the Canadian frontier has already led to the planning or actual execution of a line of railroads extending from Amherstburgh to Quebec. Thus the whole country from Lake Huron to the ocean would possess both land and water routes.

The Welland and the St. Lawrence canals, and the Caughnawaga canal, constructing between Lake Champlain and the St. Lawrence, have decided advantages over their competitors in the United States both in speed and economy; and the opening of a communication by land, by water, or both, between Lake Huron and the St. Lawrence, *via* French River, Lake Nipissing, and the Ottawa, would effect a farther abbreviation of 400 miles over the Canadian frontier route.

The head of Lake Huron is the farthest point to which the unobstructed navigation at present extends, and to which railroads are immediately contemplated. It forms a splendid reach of 1510 miles from the ocean, and is the most magnificent inland navigation in the world.

This great chain of waters has formed the basis of the whole existing Canadian development, and has laid the foundation for yet more brilliant prosperity. Improved communications have followed, and railroads will speedily exist, all resulting from the industrial activity and wealth which this great trunk communication of Nature's grand designing has called into existence.

The physical characteristics of the central portion of the Continent being similar, the adoption of the same means may therefore be followed by the same results.

The great river system which falls into Lake Winnipeg, and has its outlet by Port Nelson River into Hudson Bay, rivals the St. Lawrence in grandeur and extent, and opens the country to the very foot of the Rocky Mountains.

A third system, with an almost equal extent of navigable water, penetrates nearly to the shores of the Pacific, and indicates the approximate position of the most favourable passes through the mountains. The width and elevation of the land of the dividing

Puget Sound, on the Pacific. It is consequently more circuitous throughout, it has to encounter a greater amount of mountains, and a large extent of barren territory. It does not consist of separate and complete links, and is assisted by no similar great waterpaths. If practicable it must be confined to a trunk railway, and would be neither aided nor accompanied by any main or tributary development irrespective of actual construction.

ridges are so slight, that in seasons of flood the waters of these different systems commingle at their sources.

The climate of the upper regions of Lake Superior, and of the country between it and Lake Winnipeg, is less genial, and the soil less productive than the balmy and fertile peninsula of South-Western Canada. It bears a nearer resemblance to the sterner and more rugged lower province; but the season of vegetation, though brief, is extremely rapid, and grain and fruits come to full maturity. Farther to the west, the mildness of the climate again increases, and the waters of the west central portion, in even the 58th parallel of latitude, are clear of ice, as early and as late, if not earlier and later, than those of Canada. In Vancouver Island the apple and pear trees bud in March, the wild gooseberry appears in full leaf, strawberries are in bloom, and the swallow and humming-bird return. Between these two the climate of the intermediate country varies, approaching, according to its situation, nearer to the one or to the other. The isothermal line, which traverses the centre of England, passes midway between the southern extremity of James' Bay and the northern point of Lake Superior, then rapidly rising towards the west, runs finally nearly parallel to the Russian boundary considerably within the British territory.

The more quickly the communication is carried out to the Pacific the sooner will the results of that connection be added to those of the several independent component links, and the advantages of both be secured. A certain measure of inhabitation of the intervening country is, moreover, essential not only to the success, but to the very construction of the route. By making the utmost use of the natural facilities afforded by the great water-courses, minimum of construction will be accompanied by maximum of advance, and inhabitation carried out to the fullest practicable extent, both along the principal rivers and their numerous and noble tributaries.

1. Upon this principle of reaching the Pacific as speedily as possible, the first new link of construction would be at the Straits of St. Mary, between Lake Huron and Lake Superior. The removal of an obstacle of from only 18 to 22 feet, would add a length of 400 miles to the uninterrupted navigation. It would place this region of immense, if not unrivalled, mineral wealth in direct communication with the seaboard. Facilities of transport alone are required to lead to the highest development of the mines whence huge masses of pure copper are continually being extracted, and where mountains of iron-ore exist. The mines extend for a distance of 140 miles along the coast. It would also render the valley of the Kamenis Toquoin accessible, whence Sir George Simpson, the Governor-in-Chief of the Hudson's Bay

Company's territories, states that the mining population could obtain their nearest and cheapest supplies.*

2. The second link, from Lake Superior to Rainy Lake, opposes greater obstacles, but it would complete the opening of the country of the Kamenis Toquoh, and lead through the beautiful scenery of the Lake of the Thousand Islands to the chain of navigable waters, lovely scenery, and fertile land presented by Rainy Lake, Rainy River, and Lake of the Woods. The glowing and animated descriptions of Sir George Simpson have rendered it comparatively familiar. Successive travellers have left brilliant records of the impressions made upon them by the singular beauty of the scenes traversed upon the Kamenis Toquoh with the romantic falls of Kakkabekka, or the Cleft Rock, the Lake of the Thousand Islands, and the splendid navigable reaches of the Rainy Lake and River, and Lake of the Woods. The former is 50, the river 100, and the Lake of the Woods 75 miles long. Scientific explorers who have examined the country with a merely isolated object, and have looked upon the general character of the regions as far as Lake Winnipeg, as sterile and unattractive, have nevertheless regarded the valleys irrigated by these beautiful waters, as the proper abode of civilised man. The French, long before the period of the conquest of the country by Great Britain, had outposts of civilisation, many hundred miles beyond. Traces of implements, ruins, groves of oaks, shelving lawns, &c., attest the cultivation by the French, of posts long since again given over to neglect. Mackenzie longs for its inhabitation. Sir George Simpson briefly enumerates some of its more prominent products, among which may be numbered the plum, the cherry, and the vine; he speaks of the carrying places spangled with violets and roses, of the gentle slopes of greensward, crowned with a plentiful growth of birch, poplar, beech, elm, and oak. Wheat has been grown successfully wherever it has been tried. Potatoes arrive at great perfection; onions, maize, peas, beans, pumpkins, beet, carrots, turnips, and other vegetables, equally succeed; musk and water-melons, apples, pears, and berries of all kinds grow well and abundantly. Sir John Richardson mentions the luxuriant growth of the hop-plant, connecting the lower branches of the trees with elegant festoons of fragrant flowers. The abundance of wild rice, its uses, excellence, and the mode of gathering, have been dwelt

* The opinion of Sir John Richardson of the general mineral resources of British America is of great value, and there is abundant evidence to show its correctness. "It would be true economy," he writes, "in the Imperial Government, or in the Hudson's Bay Company, who are the virtual sovereigns of the vast territory which spreads northward from Lake Superior, to ascertain without delay the mineral treasures it contains. I have little doubt of many of the accessible districts abounding in metallic wealth, of far greater value than all the returns which the fur trade can ever yield."

upon by successive travellers. He also mentions the various maples, oaks, sumachs, ampelopsis, cornel bushes, &c.; and among flowers, asters, *helianthi*, *lophanthi*, *gentianeæ*, *physostigia*, *irides*, &c. &c., and other gay blossoms adorning the banks of the rivers, and speaks of the woodland views as equal, if not superior, to the finest he had beheld on the American continent. The sentiments of Sir George Simpson do therefore deserve to be re-echoed, when he says, "One cannot pass through this fair valley without feeling that it is destined to become the happy home of civilised men, with their bleating flocks and their lowing herds, their schools, their churches, their full garners and their social hearths." It is also much to be wished that these waters, as favourable to navigation as the banks to cultivation, may speedily have his wishes realised upon them, and be crowded with steamboats plying between populous towns upon their borders. Lake Superior has been computed to be 641 feet, Lake Winnipeg 853 feet, and the highest water of the intervening dividing ridge 1458 feet above tide-water. These computations very much exceed those of Major Long of the Topographical Engineers of the United States, who gives 1200 feet as the maximum height above the sea. They give an altitude of from 600 to 800 feet to be crossed. In the short distance of 33 miles the Welland canal surmounts an altitude of 334 feet; and the Rideau of 80 feet, at a single station.

A minute and accurate examination of the country is necessary, before it can be stated with preciseness what the intermediate altitude is that would have to be surmounted, either for a land or water route. There is no branch of the organisation of a country, political, municipal, social, or constructive, to the success of which a good map is not essential. The most elaborate survey can be carried out, and the most finished maps produced, for a fraction of the expenditure which is otherwise wasted in failure or imperfection. With regard to land and water communications, a very slight divergence of direction may not only alter the altitudes and the first cost, but permanently affect the constant expenditure upon, and utility of the whole undertaking. Especially in the improvement of the natural channels of navigation, a proper adjustment of the line of levels is of the utmost importance. The number of stations, the lengths of unchecked waterway, the reclamation or destruction of land, the first cost, and the cost of maintenance, are all involved, and show the intimate relation between details of physical geography and the prosperity of a country.*

* The Lake of the Woods is famous as having been the spot whence a line due west to the Mississippi was to form the boundary between the British Colonies and

Including the minor deviations there are almost countless methods of communicating between Lakes Superior and Winnipeg; and the reconnaissance and survey of the country for the selection of the best permanent chief means of intercourse, can be made most favourably, while temporary roads between Lake Superior and Rainy Lake, and between the Lake of the Woods and Lake Winnipeg, availing themselves of every natural facility, would open the boundless territory of the West without delay.

3. The third link, from the Lake of the Woods to Lake Winnipeg, is very similar in character to the second as to details of execution; but the Winnipeg River is more rugged, and the country less fertile, though even more romantically beautiful. The aggregate descent has been computed at 410 feet. The Rat and Red Rivers have been supposed to afford the means of opening a communication more easily, and to flow through a country more agriculturally productive. The Winnipeg River encloses a wide extent of land between its branches. The route by Covert and Sturgeon Dam Rivers is the more direct, but also the more difficult. The English River, which joins the Winnipeg about 60 miles below Lake of the Woods, affords a route by Lakes Sal and St. Joseph into Hudson Bay, and another by the Nipigon waters into Lake Superior. The Berens and Severn Rivers connect Lake Winnipeg and Hudson Bay.*

The country of Lake Winnipeg, and of its numerous tributaries, is now attained and placed in connection with the Atlantic seaboard; the country of the Assiniboine, the Calling and Red Rivers, of Lakes Winnipegosis and Manitoba, opened to cultivation and commerce. The Red River is well known from the colony which, under the unfavourable circumstances of a difficult communication with England, or with any part of America, has

the United States. From the first junction of the boundary line and the St. Lawrence, the midchannel was adopted for its continuation. A line due west from the Lake of the Woods to the Mississippi was to have terminated it. Beyond the midchannel of the Mississippi the United States advanced no claim. But a line from the Lake of the Woods due west never can strike the Mississippi. The negotiators probably confounded the site of the Grand Portage, the chief westward route, with the head waters of the St. Lawrence. If so, the St. Louis was the intended boundary. Be this as it may, the spirit of the treaty, however ill defined, clearly was, that the shortest distance to the Mississippi should be the boundary. But because a line from Lake of the Woods due west necessarily failed to strike the Mississippi, the whole western territory to the Rocky Mountains was sacrificed. Thus ignorance of geographical feature led to the surrender of a territory larger than that lost through the War of Independence.

* Mackenzie says, "There is not perhaps a finer country in the world for the residence of uncivilized man than that which occupies the space between the Winnipeg and Lake Superior. It abounds in everything necessary to the wants and comforts of such a people. Fish, venison and fowl, and wild rice are in great plenty." These things are not unpalatable to civilized man, and the vine, hazelnuts, plums, cherries, strawberries, &c., are no bad auguries of the possible results of agricultural labour.

nevertheless maintained a long-continued, and in some points a successful existence.

It would be out of place to enter upon any history of Lord Selkirk's settlement; but it is useful to have the practical proof of the adaptability of the country to agricultural purposes, wherever the trial has been made. The soil consists of a black alluvial mould of considerable depth, which when first tilled produces extraordinary crops, as much as forty returns of wheat; and even after twenty successive years of cultivation, without the relief of manure, of fallow, or of green crop, yields from 15 to 25 bushels an acre. The wheat is plump and heavy, and large quantities of grain of all kinds are grown. Beef, mutton, pork, cheese, and wool are in abundance.

Sir George Back, writing *before* the harvest season of the year 1833, says, "I learned from Mr. Berens that the colony at Red River was in a prosperous state; and that notwithstanding the failure of the crops *last* season, meat was from 1½d. to 2d. a pound, and eggs 3d. a dozen."

4. The Rapids of the Saskatchewan, near the mouth of the river, form the fourth link in the chain of westward communications. The removal of this small obstacle is all that remains to open the country to the very foot of the Rocky Mountains, and in effect to carry the Atlantic seaboard to their base. From Rocky Mountain House on the north, and from the confluence of the Bullpound River on the south branch, this river is navigable to its mouth, with the single exception named. The Assiniboine and Calling Rivers afford another means of penetrating through the country, and a considerable abbreviation of the route to the west may be effected by a road (railroad or otherwise) from the Calling River to the south branch of the Saskatchewan.

The improvement of the navigation of the rivers and lakes is not only called for in order to perfect the first great means of intercommunication, but would also prove of the utmost service in ameliorating the condition of the soil and of the country. The prairie country requires irrigation to render it of value, and to secure and regulate its natural productiveness; the summit levels are generally speaking swampy, and drainage is necessary to reclaim vast tracts of the best situated land, and to enable some of the most rich alluvia to be brought under cultivation. The detritus and driftwood have besides a continual tendency to block up the mouths of the rivers where they are deposited, and thus to render the stream at once more shallow and less useful, and to flood vast portions of the country when the waters rise. The continual tendency from these causes and from the action of blown or drift sand is to form fresh lakes, marshes, or alluvial flats; and whilst by due regulation these effects might be turned to

great advantage, they threaten, if left entirely uncontrolled, to diminish, if not destroy, the eventual usefulness of the now giant and deep rivers, and thereby incalculably to retard the full inhabitation of the country, or at least materially to increase the difficulty with which it would be attended. Some idea may be formed of the extent to which these operations are carried on, by the calculation that has been made, that the Mississippi carries down with it in one year enough deposit to make a bed of earth 1 mile square and 76 feet in depth! A proper regulation would reclaim these alluvia into the most valuable portions of land, and preserve the depth and usefulness of the rivers unimpaired.

The immense extent of country which would be opened by this last link very strongly exhibits the advantages to be derived by advancing so far as speedily as possible, and adhering to the improvement of the natural paths.

The fertility of the country is on record from succeeding travellers. "In the river Saskatchewan," writes Sir George Back, "I was not more pleased than surprised to behold on the right bank, a large farmhouse, with barns and fenced enclosures, amid which eight or ten fine cows, and three or four horses, were grazing. It belonged to a freeman* of the name of Turner."

Sir George Simpson's journey conducted him through scenery where "the rankness of the vegetation savoured of the torrid zone, with its perennial spring, rather than of northern wilds." At one time travelling through districts where his party brushed the luxuriant grass with their knees, they passed through others where the rose, hyacinth, and tiger lily, and a variety of other flowers, adorned the surface of the ground with their profusion. The sweetbriar and rose loaded the air with their delicious perfume. The hills are well wooded, the scene varied by a succession of lakes, some of which are salt; wild fowl abound upon them all. Wood and water diversify the scene. Meadows, several thousand acres in extent, forming a fine grazing country, are succeeded by extensive prairies, studded with clumps of trees. Some of the land on the margins of the tributary streams is low and swampy; the prairie, on the other hand, is parched in dry seasons. Regulated irrigation appears not only feasible, but to be the only requisite wanting to the highest degree of fertility. For a long time lightness was supposed necessarily to indicate poverty of soil, but trial has dissipated the illusion; and in the new Western States of the adjoining Republic, similar land, on which literally nothing is required except to plough, sow, and reap, has become proportionably popular. Towns, rapidly rivalling those

* Persons who have emancipated themselves from the service of the Hudson's Bay Company, have obtained their discharge, and are living upon their own exertions, are termed *freemen*.

upon the Atlantic seaboard, both in wealth and population, spring up within the measure of a lifetime.

Within a day's march of Carlton House lofty hills and long valleys, full of sylvan lakes, add beauty to the fertile scene; and the rich bright green of the sward is almost hidden by the profusion of roses and blue-bells. "From the summit of one of these hills we saw," says Sir George Simpson, "one range of heights rising behind another, each becoming fainter as it receded from the eye, till the farthest was blended, in almost undistinguishable confusion, with the clouds, while the softest vales spread a panorama of hanging copses and glittering lakes at our feet." "Country resembling an English park," completes the distance to Carlton House. Beyond Carlton, and between Carlton and Edmonton Houses, the country is equally picturesque and fertile. A vetch, or wild pea, which grows in the richest and wildest profusion, is found to be nearly as nutritious as oats for horses and cattle. The vicinity of Edmonton House is rich in minerals, and a seam of coal, about 10 feet in thickness, can be traced for a very considerable distance along both sides of the river. The southern branch of the Saskatchewan is less known, but it is said to flow through an even more fertile country. Carlton House has been computed to be 1100 feet above the level of the sea, and 630 miles from the mouth of the river.

The next links of successive construction would be the passage of the Rocky Mountains, and the descent to the Pacific; but it will be more convenient to complete the brief geographical examination of the intermediate country before proceeding with their description.

The southern branch of the Churchill, or English river, which is called the Beaver river, has its sources close to the borders of the Saskatchewan: and the chain of lakes and rivers which flow into the Saskatchewan, near Cumberland House, again bring the waters of these rivers within a carrying place of 370 yards. The dividing ridge is but a few feet in height; and when the waters have been high, the rivers have actually joined. A fatal accident occurred on the carrying place itself, from the upsetting of a canoe against the submerged trunk of a tree. This series of waters, which consists of Pine Island lake, Sturgeon river, Beaver lake, Ridge river, Half-moon, Pelican, and Woody lakes, is interrupted by many carrying-places, but of inconsiderable aggregate altitude. The same character pervades them throughout. The expansions of the rivers are like the lakes, still water, and are connected by rapids or narrow channels, with a considerable current.

At the Frog carrying-place the waters of the Churchill river are reckoned to be about 900 feet above the sea. There are several onward routes from this carrying-place, indicated by the course of the

waters. Lake Wollaston, a large circular lake about 50 miles in diameter, and situated nearly in the centre of the country, is a singular example of a lake of its size having outlets in opposite directions. A portion of its waters flows through Deer lake into Churchill river, and thence into Hudson bay; whilst another part flows through Too-oot-aw-nee river into Lake Athabasca, and by the Slave river and the Mackenzie into the Arctic ocean. *It is therefore a north-west passage!* This communication between the Mississippi, Churchill, or English river, and Lake Athabasca, has been little travelled, and the information concerning it is very imperfect. The geological formations of the Churchill river bear a general resemblance to those of the Winnipeg district, and those of the above-named lakes to those of the region of Lake Superior. The Churchill river itself is the ordinary route to the N.W. It consists of a succession of lakes or wide expansions to Lake Ile à la Crosse, which receives the waters of the Beaver river, the sources of which approach very near to the Athabasca and Saskatchewan rivers. The direct distance to the sea from Lake Ile à la Crosse is computed to be 525 miles. Mackenzie speaks of the productiveness of the country, especially of the Beaver river, and regrets that no part of it is cultivated "except a small garden, which well repaid the labour bestowed upon it." The river, which has a separate name for every expanse and every narrow channel, now assumes that of the Deep river, and conducts through Buffalo lake to Methye river. The celebrated carrying-place at this point is about 104 statute miles in length. The Clear Water river, to which it leads, is computed to be only 910 feet above the level of the sea; but Methye lake is 590 feet higher. The valley of the Washa Cumnow, or Clear Water, is celebrated for its exquisite beauty, said not to be excelled, if equalled, by anything in America. Sir George Back has rendered it familiar by his picturesque representation; travellers by their descriptions; and Mackenzie by his admiration. The heights around the carrying-place "command," he writes, "a most extensive, romantic, and ravishing prospect. The eye looks down upon the river beautifully meandering for upwards of 30 miles. The valley, which is at once refreshed and adorned by it, displays a most delightful intermixture of wood and lawn, stretching on till the blue mist obscures the prospect. Some parts of the inclining heights are covered with stately forests, relieved by promontories of the finest verdure, where the elk and buffalo find pasture." He calls it a "wonderful display of uncultivated nature;" and after exhausting language in endeavouring fully to represent the scene, he adds, "but I do not presume to give an adequate description of the scene which I enjoyed." The upper part of the Clear Water River is obstructed in several places;

but the lower portion and Elk river form a freely navigable course from the confluence of the Wasla Cumnow to Lake Athabasca, which is computed to be 600 feet above the sea. Indian hemp, from which the natives living on the coast of the Pacific form strong and durable fishing-nets, grows luxuriantly upon the banks of the Clear Water.

The range of mountains which has to be crossed at the Methye, or La Loche, carrying-place, diminishes towards the sources of the Beaver river, and almost disappears between the Saskatchewan and the Athabasca. The winter path from Ile à la Crosse to Carlton House ascends the river to its great bend, and "from Methye portage westward, the country, though deeply furrowed by river courses and ravines, and more or less thickly wooded, partakes so much of a prairie character that horsemen may travel over it to Lesser Slave Lake and the Saskatchewan." This lake, which communicates with the Athabasca river, is reckoned to be about 1800 feet above the level of the sea.

The Methye river, the Athabasca, Lesser Slave Lake, and the Unjugh, belong to the great river system which, after receiving many important tributaries, that join it farther N., flows into the Arctic Ocean by the noble stream which, below the Great Slave Lake, receives the name of the Mackenzie river. The bituminous and coal formation, that skirts the eastern base of the Rocky Mountains, shows in veins of coal, or bitumen, upon Smoking river, a tributary of the Peace river, upon the Peace river itself, upon the Saskatchewan at Edmonton, where it has been already mentioned; also upon its southern branch, upon the Elk and Peace rivers, and upon the Mackenzie river. Sulphur springs and mineral springs are found throughout the same district. Porcelain clay lies upon the coal-measures, and, where these have ignited, the clay has been baked and resembles a fine yellowish-coloured biscuit porcelain. Plumbago, iron, copper, precious stones, and other indications of great mineral wealth are found throughout the mountainous region in which these rivers have their rise.

The Athabasca is the most southern branch of the Mackenzie. It has its source near that of one of the feeders of the Columbia, so close to it, indeed, that the opposite streams flow very nearly from the same fountain head. Its course makes a considerable bend, but the distance in a direct line to the confluence of the Clear Water river is about 300 miles. The head of Lesser Slave Lake lies close to the sources of a tributary to the Smoking river, which falls into the Unjugh at the foot of the mountain chain.

The Unjugh, or Peace river, may be termed the Mackenzie Proper, since it is the largest of the streams which unite in the great trunk-stem which is so called. The sources of Finlay's branch are in about the same latitude as its confluence. The foun-

tain head of the waters of that portion which retains the name of Peace river is within a carrying place of 317 yards of a branch of Frazer river, and forms part of the track followed by Mackenzie in his discovery of the Pacific seaboard, the far western shores of the continent. The whole region E. of the mountains, between the Saskatchewan and the Peace river, is remarkable for its regular and gradual ascent, and for preserving the characteristics of a plain country till within the actual mountain chain. The valleys which form the passes through the Rocky Mountains lie transversely to them, and the principal rivers, especially those which flow towards the E., have their sources beyond the axis of the range. The Peace river forms a reach of splendid navigation, being only interrupted by a single and that an inconsiderable fall in the whole distance (650 miles) from Rocky Mountain House to Lake Athabasca. The relative level of the waters of the Peace river at its mouth, and of Stony river, varies with the season. The soil supports extensive forests, and has well rewarded the slight agricultural efforts that have been made. Mackenzie speaks of the products raised at the old establishment upon the lake itself. "Upon the banks of the Elk river," he writes, "I saw as fine a kitchen garden as I ever beheld in Canada."

Describing the whole region of the Peace river, he speaks of the beautiful meadows with groves of trees irregularly scattered over them, of the extensive plains crowded with varieties of animals, with herds of buffalo and deer, so full, indeed, as to present in places the appearance of a stall-yard. The timber is of many different kinds.

The 6th of December and the 26th of April were the days of the close and the opening of the navigation, which is later and earlier than in Canada. On approaching the mountains, he says, "The W. side of the river displayed a succession of the most lovely scenery I had ever beheld. The ground rises at intervals to a considerable height, and stretching inwards to a great distance; at every interval or pause in the rise there is a very gently ascending space or lawn, which is alternate with abrupt precipices to the summit of the whole, at least as far as the eye could distinguish. This magnificent theatre of nature has all the decorations which the trees and animals of the country can afford it; groves of poplar in every shape vary the scene; and their intervals are enlivened with vast herds of elks and buffaloes, the former choosing the steeps and uplands, and the latter preferring the plains. The whole country displays an exuberant verdure: the trees that bear a blossom were fast advancing to that delightful appearance, and the velvet rind of their branches reflecting the oblique rays of a rising or setting sun, added a splendid gaiety to the scene, which no expressions of mine are qualified to describe."

The Mackenzie river forms too interesting a feature, and affords too much evidence with regard to the general resources, capabilities, and climate of the whole country to be neglected. Nearly the whole of the magnificent river system with which it is connected is navigable throughout. The Clear Water, Athabasca, and Methye river have been glanced at. With the exception of a few carrying places, close together, and situated about midway upon the Slave river, the navigation extends uninterruptedly the whole way to the Arctic Ocean. The navigable distance below the rapids is from 1200 to 1300 miles. The prairie country, which begins in New Mexico, extends to the forks of the Hay river which falls into Great Slave Lake. Below the forks the country is covered with forest, and is swampy in parts. The Salt river, which is a tributary of the Slave river, takes its name from salt-springs, from which large quantities of pure common salt are deposited. These have proved a most useful supply to travellers to the Arctic regions, to the servants of the Hudson's Bay Company, and attract herds of deer and bison. The waters of the whole system abound in varieties of choice fish. Gypsum, in a compact form, is found at Peace Point upon Peace river, and the limestone of the formation being Silurian, has led Sir John Richardson to class these salt-springs as belonging to the Onondago salt group of the New York Helderberg series.

The Itzechadzue, or River of the Mountains, joins the Mackenzie about 155 miles direct distance from the exit of the river from Great Slave Lake. Fort Simpson, which is situated at the junction, is in $61^{\circ} 51' 25''$ N. latitude, and $121^{\circ} 51' 15''$ W. longitude.

Fort Liard is situated a little S. of the 60th parallel of N. latitude, and about 150 feet higher in point of elevation. Wheat ripens well in good seasons, and the 60th parallel has been accordingly considered the northern limit of the economical culture of wheat. How completely, then, is the opinion of the Surveyor-General of Canada (Colonel Bouchette) borne out, when he states, with regard to the immense territory west of Canada, and which is now lying desolate, "A considerable portion of it must be more or less arable, and will be submitted to the plough!"

The 65th parallel of latitude is stated to be the northern limit of the Cerealia in the Mackenzie district. In Norway it reaches to the 70th, but in Asiatic Russia no higher than the 60th parallel of latitude. Barley and oats grow well at Fort Liard and yield good crops; oats do not thrive quite so well at Fort Simpson, but potatoes and other garden vegetables are raised with success at Fort Norman, but little S. of the confluence of the Great Bear Lake river. In favourable seasons barley gives a good return there. It is usually sown towards the end of May, and ripens

in the latter part of August. Hay, for the winter provender of milch cows that are kept at Fort Simpson, is made upon meadows and marshes about the fort, and is rafted down in boats in September.

"I was very agreeably surprised," says a writer who was long in the service of the Company, and 25 years resident in the country, "to find that the high latitude of this locality (61° N. latitude) did not prevent agricultural operations from being carried on with success. Although the season had been rather unfavourable, the farm yielded 400 bushels of potatoes and upwards of 100 bushels of barley. The barn-yard with its stacks of barley and hay, and the number of horned cattle around it, had quite the air of a farm standing in the 'old country.' It is to be regretted that so little attention should have been paid to the cultivation of the soil in former times, as the produce would, ere now, not only have contributed to the support of the establishment, but have afforded assistance to the natives in years of scarcity."

Mackenzie has left an amusing account of the fabulous horrors with which the natives endeavoured to deter him from prosecuting his noble voyages of discovery; of their tales of many winters elapsing, and old age coming upon him, ere he could reach the sea; of fearful torrents and impracticable falls; of evil spirits and terrific monsters of demoniac shape.

Precisely similar idle tales were once rife about the Saguenay, and indeed have lingered round every part of British territory in America. In truth, however, steamboats could ascend the Mackenzie as far as the carrying places upon Slave River; and vessels of considerable burden freely navigate its waters. The channels formed by the large delta at the entrances and exits to and from the lakes require to be kept clear, and the driftwood prevented from obstructing the channels, as it has a tendency to do. Indeed, several of the minor rapids originate in this cause.

The river of the Mountains consists of two principal branches, flowing from the N. and S. respectively, and both rising beyond the highest peaks of the mountains through which they flow. The Dease river, a branch of the N.W. stream, is the channel by which boats pass through the mountains to the junction of the Pelly, Lewes, and Frances rivers, where the Company have a post, between 1300 and 1400 feet above the level of the sea. Two voyages are annually made between this station, called Pelly Banks, and Lynn Canal, an inlet N. of the island of Sitka, in lat. 59° , and to which steamers of the Hudson's Bay Company ply. It was by this route that Sir John Richardson received the first intelligence of the general emigration to California, in consequence of the discovery of the gold mines, which almost emptied the thinly-peopled territories of the Hudson's Bay Company. Although these rivers are

within British territory, the seaboard and Lynn Canal are within that of Russian America.

Sir John Richardson furnishes very interesting notes respecting the geology, forest growth, and botany, the quadrupeds, and birds and fish of the Mackenzie valley. After enumerating many species of each, he says:—"There is, in fact, notwithstanding the near neighbourhood of the Arctic Circle, no want of flowering plants to engage the attention; and many of the feathered inhabitants of the district recall pictures of southern domestic abodes. There is an intermingling of the flora of both coasts—the Atlantic and Pacific—as well as of the migratory feathered tribes, the Rocky Mountain range not proving a barrier to either."

The improvement of the navigation between the Methye Portage and Hudson's Bay, either by the Churchill River, to its mouth, or across the Burnt Wood carrying place down the Port Nelson River to Fort York, or from Lake Winnipeg, through the Hayes River, would effect an abbreviation of about 1500 miles on the routes to all parts farther W. That this immense abbreviation is practicable, and would prove very advantageous, notwithstanding the comparatively short period of the year during which Hudson's Bay forms a serviceable communication, is abundantly proved by the fact that it is the channel selected by the Company for carrying on the trade of the whole vast interior. It would be eagerly used as the most speedy and economical route to the Pacific during the period of the available season. By whichever of the directions between Ile à la Crosse Lake and the Rocky Mountains the first westward communication might be perfected, there would still only remain the few comparatively trifling and conveniently-situated carrying places, that have been pointed out to be improved, before the length of the Mackenzie would be added to the wonderful facilities that would exist for traversing the continent in every direction. The north-west passage, which for ages has been vainly sought for, though formed in a very different direction, and which by Lake Wollaston is a geographical fact, would then be a navigable reality. The objects for which it has been sought would, indeed, be accomplished by a different, and a more generally useful channel, through those links between the foot of the Rocky Mountains and the Pacific that yet remain to be considered; but independently of the varied resources of the Mackenzie River and valley and of the adjoining waters in fish, game, and fowl; in herds of deer and wild cattle; in metals, minerals, and coal,—the navigation of the river offers great advantages, compared with the trifling impediments opposed to it. Experience has shown the superiority of inland expeditions for purposes of exploration and of search. These would be immeasurably increased when the parties could start with the first

opening of the season from the immediate vicinity of the object of their pursuit. Although nearly all the overland voyages of discovery have resulted from the different Arctic sailing expeditions, yet the greater part of the information has been collected by the land-journeys of each. Of the expeditions of 1826, Sir John Richardson alone succeeded in navigating the Arctic regions up to the meridians required by the Parliamentary stipulations to earn the promised reward.*

It is now believed that, on a nearer approach to the North Pole, a milder climate and an open sea will be reached; and it is evident that under any circumstances the whale and fishery trades might be pursued with greatly increased advantages, if the whole season could be occupied in their actual prosecution without the loss of time in reaching and in returning from the scenes of their labours. In practice and in effect new seas would be added to their domain.

The opening of the Mackenzie River would also render the Coppermine region accessible. The approach, as might prove most convenient, might be made either by the Slave Lake and its northern tributaries, or by the Great Bear Lake, more probably by the latter. The great metallic wealth of this district is well known. The frequent theme of Indian converse at the settlements of the first traders, the asserted existence of these great mines in some part of the continent, has been one of the earliest and chief stimulants to discovery. The reality of their existence, corroborated by Hearne, has been fully established by Sir John Franklin. Of sufficient magnitude and importance to arrest the attention of the Indian, to arouse and keep alive the spirit of enterprise for several centuries, and, upon discovery, to give their name to a range of mountains, a river, a region, and a tribe of Indians, the difficulty of reaching them with sufficient transport has been supposed to render them for ever practically worthless. The opening of the Mackenzie would completely obviate this difficulty, and the Great Bear Lake itself, as well as the Mackenzie, supply, by their coal measures, an abundance of fuel.

The Hare Indians, who take their name from the animal, which abounds in incredible numbers upon the Mackenzie, and forms a principal part of their subsistence, inhabit a tract of country below the confluence of the Bear Lake River. The country is well wooded, but intersected by lakes and marshes, and numerous minor rivers.

Wild-flax grows in luxuriant abundance, the old plants lying on the ground while the new ones are rising up among them. On approaching the numerous channels by which the Mackenzie flows

* It was not granted, having been construed to apply exclusively to ships, and not to boats.

into the sea, the banks become low alluvium. The islands extend for some distance into the sea, and are covered with wood or grass, and a variety of plants and herbs and berries of different kinds.

5. The direct course of westward advance may now be resumed. The progress that may be effected by the aid of the great river systems of the interior reaches to the very base of the mountains; and the eligibility of the whole breadth of country from the frontier to at least the Itzechadzue renders it very desirable to connect the advance so far made by a line of road (railroad) from the Bullpound River to the bend of the River of the Mountains. It would give it solidity and compactness, and afford a favourable base of operations for selecting the best passes through the mountains, and render the first, that might be improved, available for all parts of the country eastward.

From the S. to within a comparatively short distance of the present British frontier the Rocky Mountains present an almost impenetrable barrier between the eastern and western shores of the continent. The N. pass by the N.W. branch of the River of the Mountains to Lynn Canal has been mentioned already. The altitude to be surmounted is not very great, but the route is circuitous, far to the N., and partly through the Russian territory. The close approximation, if not identity, of the sources of the rivers Columbia and Athabasca, has also been pointed out. There are three passes on the direct line of route, concerning which some information has been collected.

The route of Sir Alexander Mackenzie adheres to the course of the Peace and Frazer River until the confluence of the river Western Road is arrived at. The wonderful, unequalled facilities which conduct up to Rocky Mountain House on the Peace River are there exchanged for comparative impediments; but the inducements multiply more than correspondingly. A great river is still in front—the streams that flow into the Pacific almost in sight—the goal nearly attained; and who can fail to participate in the sentiments of Mackenzie, that fired his determination, and crowned his efforts with success?

After leaving Rocky Mountain House, the westward progress by water is, for a time, so frequently interrupted as to be scarcely available as a natural watercourse. The waters flow with great rapidity between steep, narrow, and often precipitous banks; after a while, however, continual reaches of navigable, almost still, water, from 25 to 30 miles in length, re-occur, and beautiful and extensive sheets of water burst suddenly upon the view. The summit level, far from being crowned with never-melting snow, consists of two tranquil lakes, the borders of which are clothed with wood, and the whole scene is enlivened by humming and

other bright-coloured birds, the inhabitants of a southern clime. The practicability of the pass can scarcely, perhaps, be placed in a stronger light than by the fact that it was discovered and crossed by the energy of one man, leading a small band of alarmed and discontented followers through an unknown country, beset with hostile Indians; the whole party being ignorant not only of the paths they were travelling, but of their distance from the Pacific, or of the fate that might there await them. Under such circumstances Mackenzie performed the passage now traced, with a canoe which, from successive repairs, had become so heavy that two men could not carry her more than a hundred yards, and so crazy that it became absolutely necessary to construct another. The table-land of the summit-level is flanked by mountains on either side, about a quarter of a mile apart. Two streams fall from the rocks into the one first approached; two others, descending from the opposite heights, glide into the second lake. The scenery of the ascent reveals a succession of picturesque beauty, and the forests, islands, meadows, and table-lands show a continuation of the same general characteristics of the country of the Saskatchewan and Peace rivers. The timber is specified as of large dimensions, the poplars as the largest Mackenzie had ever beheld; he names the spruce, red pine, cypress, white birch, poplar, willow, alder, arrow-wood, redwood, liard, service-tree, bois piquant, &c., and, among shrubs, the gooseberry, currant, and various kinds of briars.

The characteristics of the southern passes are similar; that between latitude 53° and 54° is more gradually approached, the valleys are wider, and the character of the scenery less precipitous.

During the freshets in the spring, on the sudden melting of the snow and breaking up of the ice, the narrow valleys of the northern and southern passes are sometimes completely choked by natural dams, formed by timber and fragments of rock carried down by the impetuous torrent. When the accumulated waters have acquired sufficient weight or force, these temporary obstacles are borne away before them, and the rivers and streams gradually retire within their ordinary channels. This operation of nature is indicative of a mode by which a great transit of traffic may be effected across the mountains; the narrow valleys are the river-beds, the rocky banks and bottoms the abutments and chambers of the masonry, the temporary dams only require to be made permanent, and navigable rivers—steps of still water—replace the furious and impracticable mountain torrent. The largest bodies of water admit of being regulated without danger, by providing outlets increasing in size in full proportion to the accumulated quantities of successive descents.

The central pass being less precipitous and wider in character, and having a more gradual approach, would appear the most suited to land communications. If necessary or advantageous, the principle of steps and the elevation of freighted carriages might be applied, and, with the farther aid of tunnels, the land transit of the Rocky Mountains does not seem to be attended with the difficulties—far less with the impossibilities—with which it has hitherto been invested.

The fullest examination of the chain has often been advocated on geological grounds alone, on account of their probable immense mineral wealth; such a survey, and the settlement of the eastern slope from the shores of the Atlantic to their base, could not fail to throw much additional light on the various depressions of the range.

It is worthy of remark that the Governor-in-chief of the Hudson's Bay Company's territories overtook a party of poor unaided emigrants on the plains of the central region; but although he had all the resources of the country at his disposal, they had arrived on the western slopes of the mountains, with their waggons and families, before the party travelling by the route through which the Governor conducted his guests and companions. In estimating the practicability of the passage of the mountains, it is important, moreover, to remember that they have been thus traversed whilst entirely without roads. It is only necessary to think what the Simplon would be without a road.

6. The descent to the Pacific would be accomplished by similar means. Every avenue of approach would be soon called into requisition when the great tide of development of colonization and commerce had once reached from shore to shore. Western terminations would possess the same interest that now belongs to those of the East. The similarity of these two grand terminal countries in many respects is very remarkable; the positions, harbours, mineral, forest, and agricultural resources bear a striking resemblance to each other; the seaboard of the Pacific and the whole western side of the mountains is, however, favoured with a far more mild and genial climate. It is true neither Royal standard nor British flag float any longer over the exquisite valleys of the Cowlitz and the Wallamette, of the Kootoonay or the Columbia, but the remnant left of Oregon is still intrinsically agriculturally attractive, independently of the indirect value which it derives from the circumstances of the route, and to which its position within the Empire of Great Britain is essential. This fact is too well known to require to be now dwelt upon; the richness of the soil and the unequalled girth of the forest trees have attested the fertility of the country from its very earliest discovery; and Mackenzie, who was never S. of Point Menzies,

which is more than a degree N. of the most northern extremity of Vancouver's Island, speaks of its great fertility and longs for its cultivation.

Simpson River and Observatory Inlet, the northern Salmon River, Mackenzie's route and Frazer River, all point out indications for communications between the seaboard and the passes of the mountains. The advantages of Vancouver's Island have been shown in connection with those of the entire route; its resources, as well as those of Queen Charlotte's Island, are ascertained sufficiently to establish their great value and importance.

The mode of communicating between Europe and that portion of the earth of which the shores are washed by the Pacific, that has now been briefly examined as a whole, and in its principal component parts, is the most eligible, especially for the interests and requirements of the British empire, and also for a large proportion of the commerce of the world. It must not, however, be inferred that other communications on the earth's surface are superfluous or unprofitable because they may unite the same extremities in a less advantageous manner. The proper use and relative bearing of the various routes that have supplied the data for the comparisons that have been made would furnish an interesting and useful subject for consideration. That which has been examined exhibits in every respect so complete an adaptation of means to the end proposed, as to give redoubled force to every argument that can be adduced; the opportunity of carrying it out has been long possessed by England, and for seventy-five years its advantages have been laid before her. It is the route of Sir Alexander Mackenzie, whose vigorous mind described the distant shores of the Pacific from the opposite coasts of the Atlantic, and who grappled successfully with all the difficulties that beset his path, when crossing the wide expanse of the then unknown continent. His courage and perseverance enabled him to discover both the far western and the northern oceanic boundaries of the continent, and his genius and wisdom did not fail to point out its supreme national, and its great universal, importance.

The Report of the Lord High Commissioner of Canada, dwelling upon the condition and brilliant resources of the British provinces, could but dilate upon a portion of the results which he had briefly but graphically sketched, when he suggested to his country the colonization of the continent, the development of the fisheries, and the *trade of the Pacific*.

Notwithstanding the lapse of years, the same opportunities remain, and have become not only more important and more urgent, but also, through the advance of science, much more easy of execution.

APPENDIX.

The several features or points of superiority in the proposed route, viz the British Colonies of North America, will be best shown by a comparison between it and the several routes to the Pacific, which have hitherto been proposed in competition.

The latter, taken in the order in which they are treated in the Report of the Select Committee of the House of Commons on Steam Communications with India, &c., are—

- A. By Central America.
- B. By the Cape of Good Hope.
- C. By the Indian Route.

A.—The several routes that were under consideration for communication with Sydney by Panama were—

	Miles, Nautical.	Speed in Knots.	Days.
1.—Southampton to Chagres	4,622	11,417	18
Crossing to Isthmus of Panama	90		2
Tahiti	4,500		22
New Zealand	2,205		11
Sydney	1,155		6
Stoppages . . . . .	..	..	5
Total	12,572		64

	Nautical Miles.
2.—Southampton to Panama (as above)	4,652
Panama to Huahine	4,562
Huahine to Sydney	3,277
	12,491

3.—Southampton to Huahine (as above)	9,214	11,534
Huahine to Wellington	2,320	
Wellington to Sydney (through Cook's Straits)	1,246	
	12,780	

4.—Falmouth to Panama (by the route of the West India Steamers)	5,710
Panama to Sydney by Auckland	8,210
	13,920

B.—By the proposed Cape routes, the distances were as follows:—

(Speed, 8 Knots.)

	Nautical Miles.	
1.—Plymouth to St. Vincent	2,260	Stoppages 3 days.
Sierra Leone	906	
Cape of Good Hope	3,582	
Wilson's Promontory	5,971	
Sydney	443	

13,162 Time, (total) 71 days.

(Speed, 8 Knots.)

	Nautical Miles.
2.—Plymouth to Cape of Good Hope (as above)	6,748
Swan River	4,672
Adelaide	1,345
Port Philip	505
Sydney	602
	<hr/> 13,872 Time, 80 days.

3.—Southampton to Bonavista	2,374
Bonavista to Cape of Good Hope	3,846
Cape to Wilson's Promontory	5,971
To Sydney	443
	<hr/> 12,634

4.—Falmouth to Lisbon	730	} 14,025 to Hobart Town, Tasmania.
Madeira	450	
Santa Cruz, Teneriffe	250	
Porto Praya, Cape Verdes	910	
Ascension	1,530	
St. Helena	655	
Cape of Good Hope	1,720	
Mauritius, by Algoa Bay, &c.	2,280	
Swan River	3,150	
Torbay and Hamilton	325	
Adelaide	1,050	
Port Philip	490	
Hobart Town	485	
Sydney	630	

14,635 Time, 70 days.
Speed, 9 to 10 knots.

C.—The various postal routes to Sydney that were proposed in prolongation of the Indian or Suez route, were—

By Torres Straits.

	Nautical Miles.	
1.—Southampton to Gibraltar	1,172	} Speed, 10 knots.
Malta	988	
Alexandria	815	
Isthmus of Suez (crossing the)	207	
Aden	1,310	
Point de Galle	2,121	} Speed, 8 knots.
Singapore	1,497	
Batavia	520	
Timor	1,240	
Cape York	935	
Sydney	1,905	} 5 days stoppages.

12,710 Total time, 66 days.

2.—Southampton to Point de Galle (as above)	6,615	Speed, 10 knots.
Cape Lewin (stoppages, 5 days)	3,129	} Speed, 8 knots.
Sydney	1,955	

11,727 Time, 60 days.

Nautical Miles.

3.—Southampton to Point de Galle.	5,613	Conditions the same.
Swan River	3,000	
Adelaide	1,345	
Port Philip	505	
Sydney	602	

12,125 Time, 62 days.

4.—Southampton to Batavia (as in No. 1)	8,630
Swan River, through Sunda Straits . . .	1,767
Adelaide	1,345
Port Philip	505
Sydney	602

12,849

5.—Southampton to Point de Galle . . .	6,613
Singapore	1,497
Sourabaya	760
Swan River (through Samboh Straits)	1,663
Adelaide, Port Philip, Sydney . . .	2,452

12,985

6.—Variation on No. 1.	
Variation between Dover and Alexandria by Marseilles.	22
Dover to Calais	
Calais to Marseilles, by Paris, Dijon, Châlons, and Lyons	777
Marseilles to Malta	650
Malta to Alexandria	815
Alexandria to Suez	207
Suez to Aden	1,310
Aden to Point de Galle	2,121
Point de Galle to Singapore	1,497
Singapore to Batavia	520
Batavia to Timor (North Point) . . .	1,240
Timor to Cape York	935
Cape York to Sydney, by Rainè Island Passage	1,905

12,005

7.—Similar variation, by Trieste.

Dover to Ostend	62	By rail, through Brussels, Hanover, and Vienna.
Ostend to Trieste	1,414	
Trieste to Alexandria	1,210	
Alexandria to Sydney	9,735	

12,421

8.—Falmouth to Aden	4,495
Mauritius (including Isle de Bourbon)	2,800
Swan River	3,150
Adelaide, &c., Sydney	2,980

13,425

Thus the distances to Sydney by these respective lines are:—

	Miles.
A. By Central America . . .	from 12,431 to 13,920
B. By the Cape of Good Hope . .	„ 12,634 to 14,655
C. By the Indian Route . . .	„ 11,727 to 13,425

It is scarcely necessary to observe that, where two figures are given by one route, the longer presents advantages over the shorter one in many material respects, or that, on the other hand, there are serious drawbacks to the adoption of the lines of shorter geographical distance; so that these latter difficulties might very probably lead to the selection of one of the longer lines for that of steam communication with Sydney. This point is important in the comparison of distances. The preference is awarded by the Committee of the House of Commons to the route by the Cape of Good Hope, by which the distance varies from 12,634 miles to 14,655 miles.

By the route proposed through British America, the distance to Sydney would be 11,600 miles. The capital of Australia is, however, the most favourable point in the Pacific for the first three lines, and that which places the distance superiority of the British American route in the least advantageous view.

To *New Zealand* the distances are respectively:—

	Miles.
By Central America . . .	from 11,336 to 12,765
By the Cape of Good Hope . .	„ 13,789 to 15,810
By the Indian Route . . .	„ 12,882 to 14,580
By the proposed route through British America	11,058

To *Hong-Kong* the respective distances are:—

By Central America . . .	from 13,720 to 15,760
By the Cape of Good Hope . .	„ 13,330 to 14,530
By the Indian Route . . .	„ 15,590
By the proposed route through British America	10,490

To *Shanghai* and to *Japan* the comparison is yet more in favour of the route through British America by 400 and 1400 miles respectively.

The comparison may be carried through for every part on the Pacific, but the difference is sufficiently apparent from the more important examples given.

The times to Sydney, named in the tenders, are:—

By Central America . . .	from 63 to 65 days.
By Cape of Good Hope . . .	„ 70 to 80 „
By the Indian Route . . .	„ 62 to 66 „

By the proposed route through British America the time would be 44 days, at the rates of 10½ knots by water, and 40 miles the hour by land—or, 52 days at the rates of 8½ knots by water, and 20 miles the hour by land.

These rates, chosen in order to embrace both the paddle-wheel and screw-steamers, are below that of steamers actually plying to North America. The rates per railway are less than those of express and ordinary railway travelling respectively. In both cases two days are allowed for coaling in the Pacific.

Of course the saving of time to *New Zealand*, *China*, *Hong-Kong*, or *Shanghai*, and to *Japan*, &c., would be greater in the same proportion in which it has been shown that the proposed communication through British America affords a shorter route to those places.

The third point is the superior position of the British American route, with regard to the trade winds and great circle sailing.

The Indian route, being exclusively a line for the carriage of the mails, and for a limited number of wealthy passengers, does not enter into competition under this head.

The Central American routes, too, whether by Panama, Nicaragua, or Tehuantepec, are anything but favourably situated with regard to winds or currents. The following expressive language has been applied to them:—

“There could be little difference between them: it is a long, bad voyage from them to anywhere, and a still longer one from anywhere to them.”

Though strictly applicable with reference to the intercourse between Europe and the Pacific, this overlooks those portions of both North and South Western America to which these routes are unquestionably useful communications.

The direct distance to Sydney, as appears from the tables already given, is about 12,491 miles, or about 200 miles shorter than by the Cape of Good Hope, or by Cape Horn.

The actual course of a sailing vessel is, however, given as follows:—

" Sydney to 120° W. long. between 33° and 36° S. lat.; passing north of New Zealand to the parallel of Coquimbo, to Callao, and Panama to Chagres and England 15,818 miles."

Whereas by "Cape Horn to the Straits of Le Maire, passing south of New Zealand, thence to 40° S. lat., to Cape Frio, to the Equator, and to England 13,380 miles."

A difference of 2,018 miles against Panama.

Again, to China,—the course of a sailing vessel would be:—

" To 28° N. lat. and 30° W. long.; thence to the Straits between San Lucia and St. Vincent, to Chagres, Panama, south of the Sandwich Islands (by reason of the trades), to the Ladrões, then North or South, because of the Monsoons, then to Canton 15,760 miles."

The return voyage must either be made against 8000 miles of strong head winds from the Ladrões to China, or the Coast of Japan must be followed, the ocean be crossed to Oregon, the Coast then followed to Panama, thence from Chagres to Havanna, and again following the coast and keeping the Gulf stream past Halifax to England.

By the Cape of Good Hope routes have been suggested which a screw vessel may follow to avail herself of the S.E. trade, to Sydney.

1. Touching at the Cape of Good Hope:—

	Neautical Miles.
Southampton to Panama	2,374
Bonavista to Equator, 18° W.	1,012
Equator, 18° W. to 28° 0' S., 26° 15' W.	1,746
28° 0' S., 26° 15' W. to Cape (Gr. C.)	2,504
Cape to Wilson's Promontory (Gr. C.), Composite route, maximum lat. 47½° S.	5,687
Wilson's Promontory to Sydney	443
	<hr/> 13,566 <hr/>

2. Without touching at the Cape:—

Southampton to 28° 0' S., 26° 15' W.	5,132
28° 0' S., 26° 15' W., to Wilson's Promontory	7,705
Wilson's Promontory to Sydney	443
	<hr/> 13,280 <hr/>

This would also be the course of a sailing vessel to Sydney, and shows about the same superiority as the route by Cape Horn over that by Panama in point of distance. It has the advantage of better weather.

	Miles.
To China the distance would be about	14,530
And the return voyage	13,330

The voyages have, however, averaged an equal length of about 120 days, out and home. The shortest voyage was made in 1842, by a man-of-war outward bound, which reached China in 85 days.

By British America:—The effect of the trade winds is to add very considerably to the distances by Panama; but they do not increase those by British America. To or from Vancouver's Island, either way, the wind is either fair or favourable,

or the trade can be crossed on a wind. The British American route retains all the advantages of its shorter direct geographical distances, and in this comparison has the additional superiority of the increase of the distances by the other routes in consequence of the trade winds. By an estimate of the future, which may prove to have been correct, but which for immediate practical purposes has been overstated, it has been said, that not much stress ought to be laid upon the advantage of the position of Vancouver's Island, or of the British American route, with regard to the trades or currents, because the auxiliary screw-steamer vessel is destined to supersede the ordinary sailing vessel for the purposes of oceanic navigation. Granting that this surmise were perfectly correct, it is obvious that the whole principle of the auxiliary screw is set aside, if 3000 miles of very strong head-winds be deliberately encountered. Whatever be the vessel employed, the points of superiority of a less distance and a more favourable wind are clear. Their actual effects in time may be diminished; but their relative results cannot be altered. Vancouver's Island must ever retain the advantages resulting from its numerous harbours, and its position with regard to great circle sailing and the trade winds. Every circumstance which tends to increase the intercourse between the hemispheres must lend an additional value to these advantages.

The proposed route through British America is without a rival in respect of salubrity, both as to man himself and the products conveyed by it.

Of the three older routes, that by the Cape of Good Hope most nearly approaches it; but is inferior, owing to the length of the voyage and the latitudes traversed.

Panama is as notoriously sickly as tempestuous, so much so, that the healthy season is confined to three months of the year (December, January, February), and that during which it is considered safe to approach the coast—to five. Storms and calms alternate during the remainder of the year. Many products are inevitably destroyed and others materially injured by a lengthened voyage through tropical climates.

This latter objection, and the numerous transshipments that would be required, apply also to the Indian route, and render it unavailable for the conveyance of products.

The proposed route through British America alone includes every kind of communication.

By the electric telegraph, it annihilates in effect 3000 miles of the whole distance, virtually bringing Sydney, New Zealand, China, and Japan, &c., within 8600, 3059, 7490, and 6090 miles respectively.

The future will resolve, and that perhaps speedily, what the further application of this mighty messenger may effect. The extension of a line from St. Petersburg to Behring Strait depends only on the provision of fuel; from thence the crossing of the Strait and a junction with the Western terminus of the British American route, would complete the electric communications round the habitable earth. Or the same result might be obtained by following the South and Eastern shores of Asia to Behring Strait. Again, the extension of the bank of Newfoundland to within a comparatively short distance of the coast of Ireland, has been supposed to indicate the possibility of stretching an electric connection across the Atlantic. This would literally form a girdle of telegraph extending round the globe.

The shortest and quickest is obviously the best *postal* route.

It is also evident, from what has already appeared, that it is the best route for all produce likely to be injured by a lengthened voyage and tropical heats, and for every kind of merchandise in the conveyance of which speed is at all desirable. It may be added, that both with regard to economy of time in the carriage of freight, and even of the use of the electric telegraph in communications, we do not understand or at least avail ourselves of their full value. In British America and the United States the telegraph is in continual use on all occasions, while it must be an affair of no ordinary importance to which it is applied in England.

Circumstances necessarily render it more costly in Great Britain; but the proper adjustment of price and use has hardly yet been found. Again, in the carriage of freight the vessel that performs its lading, voyage, and discharge, while another is lounging at the wharf, must carry off the prize.

It might be thought that in the carriage of the heaviest merchandise, and when time is comparatively of little importance (if such a case there be)—that crews are just as costly, though not so profitable, whether they convey fifty or but one cargo;

in such a case, it might be thought that the Cape route without transshipment must prove superior.

Even this, however, would not be the case; an examination of the details of the route and of its several component parts, would show the various circumstances that unite to favour its construction, and to render it economical. The calculations by which this point would be established cannot be entered upon here. It may suffice to state at present, that it has been shown, with reference to a route proposed by Mr. Asa Whitney * through the United States with a view to connecting the same extremities, that, assuming a high basis of computation, freight could be carried from Canton to New York for less than two-thirds of the cost via the Cape.

Its national independence is perfect. An approximation to this condition is considered so essential, that it was one of the four primary points required by the Select Committee of the House of Commons, "That the line or lines selected should be as free as possible from those political objections which necessarily attach to a line dependent on other countries for its communications."

The proposed route through British America would render the communications of Great Britain independent of the world; and India, if menaced, could be supported from the W., as well as from the E.

The completion of this great highway, so useful to the universe, though emphatically national, would tend greatly to the continued duration of peace.

The proposed route by British America would establish direct and mutual intercourse between—

1. Europe, Asia, and America,
2. England and all her Colonies,
3. And between the several Colonies.

The importance of connection has been so highly esteemed, as to have been pressed as deserving consideration even before a certain measure of time, speed, and distance, in the selection of the first Australian route to be established.

It only requires to look at the globe, and a very little reflection, to perceive how incomparable the British route is in carrying out this condition. It would essentially foster inter-communication between the several parts of the empire, and call into existence an illimitable commerce and intercourse with British America. Both by direction and rapidity it would bring the most densely populated regions of Asia, those at present most excluded from the world, into close and practical contact with Europe. The activity thrown into the Pacific would reach India, China and Japan, Borneo, the Burmese and Siamese Empires, and Polynesia.

These advantages are yet enhanced by contrast. The Central American Routes unite, as far as British interests are concerned, nothing but the extremities. If successful, they would seriously endanger the carrying trade and commercial power of England, as the United States Committee on naval affairs has elaborately proved.

If unsuccessful as a route, they would prove a waste of energy and capital, damaging the prospects of truly eligible modes by which to join the oceans.

The Cape route unites but little that absolutely depends on its adoption for intercourse.

The Indian route forms indeed a part (though but a small one) of the same connection, but is only applicable to postal purposes, or little more.

* See Volume XXI. of the Journal of the Royal Geographical Society.—Ed.

XIV.—*Some Account of the Volcanic Group of Milo, Anti-Milo, Kimolo, and Polino.* By Lieut. E. M. LEYCESTER, R.N., F.R.G.S.

Communicated by Admiral BRADY.

Read May 10, 1852.

Milo.—This island, situated in $36^{\circ} 45'$ N. lat. and $24^{\circ} 26'$ E. long., is familiar to most mariners who have traversed the *Ægean Sea*—and what naval officer in the course of his career has not been acquainted with a Milo pilot, or, to avoid the fury of a strong N.E. wind, has not sought shelter within its ample port? To accompany the excellent survey by Lord John Browne under the direction of Capt. Graves, it may not be inopportune to collect a few notices relating to it.

The harbour of Milo bears about E.N.E. true from Cape St. Angelo, in the Morea (the ancient Malea), and is distant from it about 60 miles. On its N.E. coast are the outlying islands of Kimolo, Polino, and some dangerous rocks and shoals. On the N. it has the Akrathes islands; on the N.W. Anti-Milo, with its steep sides and towering peak, 2500 feet above sea-level; and off the South Cape, Psali Partchel, distant less than 1 mile, lies Prassu Nisi. Finally, to the S.E., off Cape Stiletto, distant $3\frac{1}{4}$ miles, are situated the rocks called Ktania.

If we suppose that we are steering towards Milo from the Gulf of Athens, the wind strong at N.E., or mal-tems, we are carried rapidly past the isles of St. George d'Arbora and Anti-Milo, now capped with fleecy clouds, and approach the shores of Milo: the white surge dashing violently against its black basaltic cliffs shows a strange contrast; and from an agitated sea, we find ourselves securely anchored on the eastern side of a calm and placid basin, of great expanse: the course has been about S.E.b.S. $\frac{1}{4}$ S. (true), and the distance about 90 miles. The entrance to the harbour is open to the N.W., and as we approach near to it the strata of the shores show out in many colours. On the port hand is a remarkable crag; the summit is covered with a scanty herbage, the sides are white, varied with streaks of chocolate, red and yellow running into it; more to the N.E. the shores are of white tufa, in places lofty and rugged, then low and regular; and those more directly opposite to Kimolo or Argentiera are almost black, like some parts of Santorin.

Within the port, from the anchorage, near the little village at the Scala, now peopled by a colony of hardy mountaineers from the fastnesses of Sfakia in Crete, the voyager naturally casts his eyes around, and, if it be spring, the prospect is not unpleasing, the country being covered with corn, and in places with vines. A great part of it to the S.E. is a plain, in the centre of which stands

the mediæval town, which in the time of Tournefort numbered 5000 souls; in that of Olivier, a century later, not more than forty families; and now, in 1849, only a few ragged wretches are scattered among its ample ruins, consisting of houses of the middle ages and of the present time.

To the S. the country assumes a more hilly and rugged aspect. To the S.W. we see the chain of mountains, of which St. Elias is the principal, its peak being 2545 feet above the sea level. The geographical features of the coast, as described by Lord John Browne, are as follow:—

April 28, 1849.—Commencing from Cape Vani, the western cape on entering the harbour, the land trends to the S.S.W. in a jagged broken form, and contains three bays, as far as Cape Psali Partchel, the S.W. extreme of Milo. These three bays are called collectively Triathes, but the name is more generally applied to the central bay, the only one in which a vessel can anchor. Cape Akroteri, the N. point of this bay, is $2\frac{1}{2}$ miles from Cape Vani; off it the rocks extend to $\frac{1}{4}$ of a mile, some under water and some awash. In this bay vessels may lie in N.E. or easterly winds, but it is quite open to the W. The bottom is fine sand, depth 8 fathoms $\frac{1}{2}$ of a mile off shore; its propinquity, however, to the port of Milo is a strong reason for not making use of it. Separated from it by a broad rocky point is the bay of St. John, "Hagios Ioannes," a rocky open bay, with a foul bottom and no anchorage. Tournefort speaks of iron being found near St. John's, the spot being called St. Jean de Fer; but I could hear no account of it. The monastery of St. John's stands on a little hill in the centre of the ravine at the head of this bay; S. of it, scarce $\frac{1}{4}$ of a mile, is a hill 1400 feet high.

From this bay Cape Psali Partchel (as it is pronounced) is 2 miles distant to the S., and Cape Vani 5 miles to the N. The cliffs of this coast are generally of a greyish black.

To the S.S.W. of Cape Psali Partchel, and distant 1 mile, is situate Prassu Nisi, a rocky island 1 mile in circumference: to the S. of it the rocks are visible above water to the distance of near $\frac{1}{4}$ of a mile, and from them a bank extends to the S.S.W. one mile off shore, gradually deepening to 20 fathoms. There are rocks all round the isle to the distance of $\frac{1}{4}$ of a mile. Between it and the cape there is a clear passage, having not less than 10 fathoms in it: there are a few rocks off the cape, but they are close in shore.

Close to the S.W. corner of Milo there is a place called the Porto di Malta, which is said to have been a great place for pirates. This little nook, which is to the E. of Cape Psali Partchel, has a small island near it, between which and the mainland there is a passage, on both sides of which are numerous bollards

cut in the rock, intended for boats to make fast to: it is a very concealed place, and boats might pull past without perceiving it. It is also well sheltered from the summer breezes. There is a narrow, cliffy, deep little ravine, the water from which falls into the sea in this little bay, to the W. of the small point. The sun scarcely ever shines into this ravine, in which there is a deep hole, always full of rain-water summer and winter. There are some stunted firs, wild olive, and other trees near; it is the best place for fire-wood on the whole island. Flocks of goats and sheep are constantly near for the benefit of the water. The shepherds never mentioned anything like a cave near, that would in any way identify itself with the grotto of the corsairs mentioned by Tournefort.

From thence the land trends to the eastward, in which direction it runs pretty straight, with trifling indentations, to Cape Akroteri ("a common name among Greeks for a high rocky headland"), a distance of nearly 5 miles. Along this coast the land is steep and rocky, rising into precipitous hills, interspersed by deep ravines: it is totally unfit for cultivation, and only affords pasturage for a few mountain goats and sheep; fire-wood can be cut in the ravines, but there is no water. In strong northerly winds the squalls come down off these hills with great violence.

Cape Akroteri is the western point of Provato Bay, a good anchorage in northerly winds, but open from E.S.E. to W.S.W.; it has a clean bottom of fine sand, and depth varying from 18 to 7 fathoms close off Provato, a red point in its centre: it possesses also the additional advantage of being only 2 hours' walk from the Scala within the port of Milo; to the nearest part of the harbour it is only 1 mile across. Provato Bay may be known by the red appearance of both Provato and Akroteri, which are bluffs, but not high.

Off Cape Phiriplaka, the eastern point of the bay, is a dangerous rock $\frac{1}{2}$ mile from the shore, with only $1\frac{1}{2}$ fathoms on it; between it and the cape there are 6 fathoms. An Austrian vessel was wrecked on this rock in 1847. From this cape the land turns a little to the northward, forming a small bay, surrounded by precipitous cliffs, terminating in Cape Kalamos, a high bluff cape, and the most western point of Palæo Khori Bay. This bay is 1 mile wide, and at the E. end of it there is good anchorage in northerly winds; the bottom is fine sand, and depth 10 fathoms $\frac{1}{2}$ mile off shore. Cape Stiletto, a narrow black point, above 100 feet high, is the E. point of this bay: $2\frac{1}{2}$ miles off this point, in an E.S.E. direction, lie the Ktania rocks, two dangerous rocks, about 20 feet high, but having deep water all about them; at a distance they have the appearance of two vessels close together. From Cape

Stiletto the land turns gradually round to the northward, rising into high precipitous hills, broken by deep ravines; close to Cape Rema, the eastern extreme of Milo, there is a small sandy bay at the mouth of a deep ravine, from whence a very valuable kind of millstone is procured. From thence, following the coast to the N., after passing a cliff of considerable height, the land slopes much; perpendicular cliffs are succeeded by sandy bays and undulating hills, well cultivated. The great defect of these islands is the scarcity of good water, the few existing wells being brackish. The colour of the eastern coast is generally of a brick-red, mixed more or less with white. $2\frac{1}{2}$ miles to the N. of Cape Rema there is a large shingly bay, called Vouthia; but although it is well sheltered, there is no anchorage in it, the bottom being foul. At its northern extremity, and off the N.E. extreme of Milo, lies Pilo Nisi, a small islet, close to the mainland. Polino lies due E. of it $3\frac{1}{2}$ miles, and Kimolo stretches along to the northward, the nearest part being $\frac{1}{2}$ of a mile distant; and Cape Polonia bears W. by N. compass 1 mile. Close to the S. end of Pilo Nisi on the main isle, at the foot of some cliffs, heat is emitted through the fissures of the rocks, and some sulphur may also be seen about.

Between Pilo Nisi and Nipolino lies the small island of St. Giorgio, with some smaller islets. Off its S.W. extreme, and distant from Pilo Nisi one mile, $\frac{1}{2}$ of a mile off St. Giorgio, and due W. from its centre, there is a reef of rocks with only 1 fathom on them. These rocks narrow the passage between Pilo Nisi and St. Giorgio to $\frac{1}{2}$ of a mile, the water here being 20 fathoms, and gradually decreasing as you approach Kimolo. Having passed Pilo Nisi, there is good anchorage in Kimolo, Alik, or Polonia roads, as the different parts of it are called by the natives. They are sheltered from all winds except from the S. to the E.S.E., and may be recommended as a good anchorage for vessels going to the northward, having an advantage over the port of Milo, as they are less difficult to get out of with the wind from that quarter; and having three passages, a vessel has free egress whichever way the wind may be. The first is the Polonia passage; the second, that between Kimolo and Nipolino, keeping clear of the Katergo Rocks; and the third to the southward of Nipolino, either to the eastward or westward of St. Giorgio. Tournefort infers from the etymology of the word that a temple of Apollo once stood on Polonia. The bottom is fine sand, and depth varying from 6 to 15 fathoms. On the E. end of Alik, a sandy bay on the S. side of Kimolo, there is a small island, Katergo: close in-shore to the E. of it lie the Katergo rocks, $\frac{1}{2}$ of a mile from Katergo, and the same distance from the Kimolo shore. They are awash, and break with the slightest swell. Katergo has other contiguous rocks, but they are close to the shores.

Cape Ammonia is the S. point of Kimolo, and is only $\frac{1}{2}$ mile distant from Cape Polonia, the northern point of Milo, from which the passage takes its name. Off Cape Ammonia some rocks are visible above water, and outside of them are others sunken; the extreme of them, however, being only $\frac{1}{2}$ of a mile off that cape. Keeping clear of these rocks, the Polonia passage is free from all danger, the deepest water being on the Milo shore; and vessels should keep well over on it. To the W. of Polonia there is a long reef of rocks close in-shore, and above water; there is deep water close to them. Passing westward from thence $\frac{1}{2}$ of a mile, Kaloyeros isle is brought on the port-bow, a small bay intervening between it and Cape Polonia. It is a large conical-shaped rock, from whence the land trends inwards, or to the S., forming a large bay, rocky, and near 4 miles wide. It is quite open to the N., and has several little islets in it. The peninsula that separates it from the port of Milo is nowhere more than two miles across; and in one place little more than one mile as the crow flies. The shores generally are low; and towards the eastern part the land appears in a good state of cultivation. Towards the W. end of the bay the coast is higher, precipitous, and jagged. Kaloyeros isle or rock is black in colour, and blunt at top, formed of columnar trachyte. The main land opposite is the same. Cape Chidathe is the N.W. extreme of this peninsula; and off it, distant about $\frac{1}{2}$ of a mile, are two small cliffy islets, having a clear passage between them and the cape more than $\frac{1}{2}$ a mile wide, 34 fathoms the deepest water. Between these islands, which are close together, there is no passage.

In answer to a question by letter, Lord Browne tells me that the cape inside of Kaloyeros rock is black until you go a short distance to the southward, on the W. side, when it changes to a particularly well defined line of white, the two forming a remarkable contrast to each other. He adds, "I have not seen the Giant's Causeway, and cannot say whether the cliff we talk of is like it or not; but it certainly is very remarkable. I do not think the word *columnar* appropriate. It presents the appearance of a number of black elongated oblongs, or rhomboidal-shaped rocks, pressed together by some tremendous force, and then hove up by a convulsion of nature. They are slanting, not perpendicular. It has a very imposing appearance."

Kimolo.—The island of Kimolo (the Cimolus of the Latin and Greek writers), or, as it is called in the old charts, Argentiern, lies to the N.E. of Milo. It is of an irregular round shape, and between 14 and 15 miles in circumference. The inhabitants amount to 1100 in number, who all reside in a town on the S.E. side of the island. A considerable portion of the land in the neighbourhood of the town, and on the S. side of the island, is cultivated; but the

whole of the northern half is rocky, mountainous, and sterile. The highest peak of Kimolo is 1305 feet above the level of the sea. The remains of an old building, apparently Venetian, are still to be seen on its summit. Like Milo, it has no water except the rain that is caught in cisterns; the wells are all brackish. The inhabitants are dirty in the extreme; and there are few places in the archipelago so offensive as their habitations.

The only harbour in the island is on the E. side, opposite Nipolino. It is a small creek, sheltered from all winds, called Agios Minas; it has 3 fathoms water; and vessels of more than 250 tons burthen moor in it, head and stern, with their anchors laid out to the entrance, the S.E. The only trade of the island is stone for building, which is of so superior a quality that it is exported to Constantinople. Ancient tombs have been found on the S.W. coast of Kimolo.

To the S. of this port there are some rocky islands $\frac{1}{4}$ of a mile off shore, with rocks between them and the point abreast. There are also some other creeks on the E. side of the island, where caiques take refuge; and the small vessels of the country sometimes anchor off the S.E. end of Kimolo, between it and the island of Stathi, nearer to the latter than the former. The anchorage is, however, very small, only $\frac{1}{4}$ of a mile across, and open to the N.E. It is not to be recommended. The shore of Kimolo is, for the most part, black.

Polino.—Polino, or Nipolino, generally pronounced by the natives "Pō-li-vō," is a precipitous and barren island, lying S.E. of Kimolo, and distant from it about 1 nautic mile. The greatest length is from N.W. to S.E., and, with the exception of about 4 acres on the W. side, it is totally uncultivated. We found but one shepherd upon it, tending a few sheep and goats. Between it and Kimolo there is a clear passage, fully $\frac{1}{4}$ of a mile wide in the narrowest part. It contains no port, but has a small bay on the W. side, with an island in it, St. Manoli, where there is a good anchorage in northerly winds for small vessels. The N.E. and S.E. sides of Polino are surrounded by high cliffs with deep water close to the shores. The cliffs of this island are also generally black; but on the S.E. side white, with a little red. The highest peak is 1168 feet.

Thus far my information has been supplied by Lord John Browne on the coast-line of Milo, its adjacent isles, rocks, and shoals.

Anti-Milo.—This island, which lies about $5\frac{1}{2}$ miles N.W. of Cape Vani, is little more than 6 miles in circuit. The highest point is 2330 feet; and the shores are for the most part precipitous. Lord John Browne told me that when he was last on it he was informed that on the summit there is a large artificial tank

cut out of the solid rock, which the Meliots declare to be a work of ancient times; for what use they know not, whether for animals or man: most likely the former, as the isle is too steep and bare to be inhabited, except by shepherds. He also added, that it possesses good grazing for sheep and goats. The N. end is a very steep cliff, and has an imposing appearance. Many surmises have arisen among voyagers as to the nature of the animals now wild on Anti-Milo; some have suggested that the isle was a preserve for deer in the time of the dukes of the archipelago. Few people seem to have landed on its steep rocky shores. About $3\frac{1}{2}$ miles E. by N. true, off Cape Zigraro, the N.E. extremity, there is a rock having 40 fathoms least water on it, though the average depth around is about 150 fathoms.

According to Lord John Browne's survey, the coast-line of Milo is a circuit of about 35 miles, from Cape Chidathe on the eastern side of the harbour's mouth to Cape Vani or Varni on the western side. This will give a good allowance for indentations; the harbour, measuring also from those points, will give about 15 miles more, making a total coast line of 50 miles. Tournefort makes Milo 60 miles in circuit, and Olivier the same; and more recently, in the 'French Scientific Expedition to the Morea' (vol. ii.), the same extent of coast is given.

Properly speaking, the harbour does not commence before we arrive off Cape Kalamaria, which is immediately opposite the ruins of ancient Melos, the former being on the western shore, the latter on the E.; and the voyager steering in may see the cliffs under the site pierced with many tombs, for the most part inaccessible except by boats.

From Cape Kalamaria to the opposite shore it is 1 mile across; and the port from these points is full 10 miles round. The anchorage for a small frigate like the *Volage* is in 7 fathoms about $\frac{1}{2}$ of a mile S.E. of the small village of the Scala. Larger ships should lie farther S. in 15 to 18 fathoms, and $\frac{1}{2}$ mile off shore. I have seen vessels in heavy squalls drive to the S. end of the bay; but they were country craft, with probably bad ground-tackle. The harbour has been called *Protothalassa* by some people; but Lord Browne tells me that he never heard it called so; and during our visit we never heard it called anything except "the Port."

I have since received the following remarks from Lord John Browne, which are rules for approaching the harbour of Milo by night:—

Sailing Directions.—Supposing the voyager approaches it from the N.W., a good guide is the *lowest* part of the island, which lies to the left of the high peak of Elias, and for which a vessel should steer direct, until seeing the islands on the N. side of the entrance and the Crow's Nest; but if approaching from the S. of Anti-Milo,

this rule will not apply, as then care must be taken to avoid the western point on entering, which is a red bluff, about 200 feet high, which would appear comparatively low by night; also for taking further directions for entering from the S., take the compass course into the harbour off the chart; and a vessel would always be safe in keeping clear of the shore until she brought the lowest land to that bearing, when, by steering direct for that part of the island, she could not go wrong, as the coast is bold, and the islands and Crow's Nest are very remarkable; but on entering keep close to the Crow's Nest shore. On a moonlight night the entrance can be seen quite well some distance off. The best holding ground in the harbour is about $\frac{1}{4}$ mile to the S.E. of the Scala, between it and the marsh, but nearer to the former, as it is sheltered from the W. and N.W. winds, which throw a swell upon the coast, by the marsh; nearer the Scala the ground, though equally good, is more cut up.

I have observed that the port of Milo is open to the N.W., and that it affords excellent shelter from all winds, particularly the mal-tems, which blows with so much violence in July and August.

On May 25th I proceeded to the summit of Elias, in order to get a general view of the country. The atmosphere being clear, there was no impediment to the use of the theodolite, and the necessary angles were taken. In the distant prospect we counted thirty-three islands of the Grecian archipelago, Peloponnesus and Attica comprising a part of the view. Crete, to the S., with its noble chain of mountains, bounded our view on that side; Ida, and the higher part of Sfakia, or the White Mountains of Strabo (p. 475, ed. Casaub.), being partially covered with snow.

Mount Elias, though insignificant as a mountain, is nevertheless high for a small island like Milo, and from its summit the neighbouring peak of Anti-Milo appears in close contiguity, but a little lower. The isle of Milo itself stretches out at one's feet in panoramic view, its harbour almost bisecting it in a N.W. and S.E. direction, the distance across from Provato Bay to the port of Milo being only a mile. On the summit of Elias is a small church dedicated to that saint; indeed there is scarcely a high peak in the Archipelago which does not bear this name. The western half of Milo is chiefly calcareous: it is also very mountainous and precipitous, susceptible of little cultivation, with no habitations for man, with the exception of a convent on the eastern slopes of the mountain, and a few huts. The eastern half comprehends a large and fertile plain with the ruins of a town built in the middle ages; also many vineyards, corn-fields, and three or four villages, at and around the Kastro, or Crow's Nest, known to the French as Sifours. Pliny (iv. 12) calls Milo perfectly round, and Tournefort follows him, but a glance at the map will disprove that assertion, for the

W., S., and E. shores are more straight than round. From the Elias of Milo can be seen the mount Elias of Santorin, bearing about E.S.E., and distant about 57 miles. The two islands are not very dissimilar in structure, inasmuch as they are in a great measure formed of volcanic materials, though Santorin has given birth to craters of elevation and the former has not; at least there is no record of them.

On our descent from Elias we visited the convent of Santa Marina on its eastern slopes; it is now almost a ruin. There are around it many orange, olive, cypress, and arbutus-trees; and there are two very good tanks or wells of water. It is the lowest of the two establishments on this side of the mountain; the upper one is used as a storehouse, but was formerly a monastery; even in the time of Olivier it was flourishing. I could not discover the cause of its decay. About $\frac{1}{2}$ a mile to the E. of it is a large vein of gypsum on the side of the mountain, from whence quantities of that article are extracted and exported to Athens: they use it for clearing their wines, and in some countries it is used for manure. It is mentioned by Pliny (xxxv. 6). We returned to the ship by the road round the port over a country at first rugged and volcanic, plentifully strewed with obsidian, and then more flat at the foot of the plain.

Only one town in Milo is mentioned by ancient writers (Ptolemy, Pliny). The ruins are manifest on the eastern shores as one enters the harbour immediately opposite Cape Kalamaria, and about 1 mile S.S.E. of Cape Bombarda. Olivier was the first who described this site, and it has since been described by Colonel Leake and others, and more recently by Professor Ross. As I assisted Mr. Wilkinson in measuring the wall and catacombs, it may not be out of place if I say a few words on the subject. Landing at the little village at the Scala (now colonized by a band of Sfakians who, preferring the rule of Otho to that of Mustapha Pacha in their native isle, have come over to reside in Milo), we pass up the hill in a N.W. direction towards the Kastro or Crow's Nest, which is perched on a pinnacle. Our road is over white trachyte conglomerate, plentifully strewed with obsidian; on our right is a deep hollow or circular basin among the hills, having a flat bottom, and the appearance of an exhausted or extinct crater, the lips marked by volcanic tufa, with pieces of obsidian imbedded in it; on each side of the road are small caverns, and here and there tombs cut in the volcanic conglomerate. In 40 minutes we enter the village of Tripiti, and, after passing through it towards the Kastro and beyond a few houses called Limni, our attention is attracted by the trace of ancient walls on the left of our path, composed of roughly fitted polygons. Striking out of the road we follow their direction up a rugged hill on the left, having a jagged

surface, with here and there traces of the foundations of ancient buildings. This hill, which is called Bereadi, is precipitous on almost every side, and was probably the Acropolis of the city. From this height we see nearly the whole of the ancient site, its elevation from the bay being about 800 feet. To the S.E., distant about $\frac{1}{2}$ of a mile, is the above-mentioned village of Tripiti, and in the interval a deep glen, the sides of which are pierced with innumerable tombs. This gorge runs from N.N.E. to S.S.W., and meets another of the same kind nearer the sea, which stretches from E. to W.; below their junction are some gardens and water in a small valley close to the sea, which is called Klima. The former of these glens forms the eastern boundary of the city.

To the S.W. Mount Elias appears in full view on the opposite side of the Melian bay, the waters of which are close under the site of the city. Melos, like Delphi, and many other Greek cities, was for the greater part built terrace-fashion on and around the slopes of a hill which is still called Apollon, and is situated S.W. of what I assume to be the Acropolis. Upon its summit are the remains of an old church called Hagios Elias; and as there are many fragments of marble columns on and around it, I should suppose it was the original site of a temple, being a fine spot for that purpose.

Between this hill and the rocky cliff below the Acropolis is a table-land, now converted into gardens and corn-fields. We found there some fragments of columns, cornices, entablatures, &c., principally of the Corinthian and Ionic orders; also to the S., below this elevated plateau, built into the side of the hill, and having a S.W. aspect, are the remains of a beautiful little Greek theatre, which was cleared away by order of the King of Bavaria in 1836. This elegant structure seems never to have been finished: it has no signs of wear, and the marks of the chisel are all sharp; the soil removed from within was all volcanic matter, and we may attribute the pure whiteness of its marbles to their having been for so many centuries shielded from exposure. It has nine incomplete concentric circles, and six complete; also it never was intended to have more than one series of seats, being but a small theatre: they are of the purest Parian marble, each block of which is marked with the letter β , for what reason I cannot divine, unless, as we mark government property with the broad arrow, the β is to denote Basileus. The diameter of the *Kόλον*, or even, is 88 feet, and, this being more than a semicircle, probably the building is a Greek work, the Roman theatres being exact semicircles.

There are large portions of an Ionic entablature and cornices lying within the theatre in an unfinished state, some of the ornamental parts of which have been lined out for the chisel, but not

completed. We found that the site of the city was enclosed by about 6026 feet of wall, and the sea frontage might have comprised about 1500 feet more. The western wall is traceable from the cliffs on the sea-coast to the cliffs under the Acropolis: also on that side, with an exception here and there, where more modern repairs have replaced the old wall. It is of the Cyclopean species of masonry. We found the general width to be from 10 to 12 feet: the piers are generally of what I believe is termed the third species, or of regularly squared blocks. The drawing in the plan of the city, executed by Mr. Wilkinson, will sufficiently explain the different styles and ages of their structure. Perhaps the repairs may have been effected after the sack of Milo by the Athenians, as recorded by Thucydides. The western wall approaches the Acropolis, or heights above, in a zigzag form, having square towers of defence at its angles; some of the land without it has evidently been disturbed and overthrown by earthquakes. A short distance to the N. is an ancient place of sepulture, probably of the Roman period.

Near the Cyclopean tower, F in the plan, a fine statue of Æsculapius was found. Descending from the N.E. angle of the Acropolis, we trace the wall in a southerly direction, having in many places courses of the polygonal kind correctly joined, but rough on the surface. One hundred and fifty feet of it are seen in continuation from thence. Keeping in a S.W. direction, with here and there fragments of the wall, and the hill sloping to the sea, after an interval of 700 feet we arrive at a round tower, which the polygonal wall joins, although the tower itself is of regular masonry, built after the manner of those which are still to be seen at the Piræus of Athens, also at Platea in Boeotia, and Eretria in Eubœa. This tower, which has many courses perfect, is 30 feet in diameter. A few paces S. of it, without the city wall but immediately beneath it, there is a regular platform E, on the edge of the ravine, above which it is supported by a gigantic wall of polygonal masonry, which in places is quite perfect and 20 feet high. This space is 450 feet long by 140 feet in width, and appears to have been the site of a temple, perhaps that of Venus, or some large public edifice. The statue of the famous Milo Venus, now in Paris, was found in this locality. The wall terminates 100 feet to the S.W. of this spot; that is, no more traces of it exist, though probably it ran down to the sea and joined the tower under the high cliffs of Klimati Vouno on the opposite side of the little valley before mentioned. On the plan there is a gateway marked L, apparently the place of ingress, from what I have assumed to be the site of the temple of Venus, into the city, and it takes one close to the little theatre. The greater part of the stone with which the city walls were constructed is of a dark colour, in places nearly black, showing symp-

toms of having been much exposed to the action of fire; in fact, many of the cliffs on the coast, such as Cape Mavro, Kaloyero isle, &c., are of the same colour. The wall marked K in the plan, a short distance W. of the theatre, is almost black. In many places within the city tessellated pavement may be detected by removing a little of the soil, particularly on the S.W. slopes of the hill Apollon. Coins of Melos are now and then found, but I was unable to obtain any on account of the exorbitant price demanded.

Perhaps there is nothing in Milo or in the Archipelago more curious than the vast extent of tombs and catacombs in the side of the mountain under the village of Tripiti, and also in the face of the sea cliffs opposite Cape Kalamaria. The most extensive set which Mr. Wilkinson and myself measured consist of many hundred feet of passages and chambers. These depositories have no doubt been prepared for this purpose at a period subsequent to the Christian era, as the inscriptions or epitaphs in red paint over the tombs sufficiently testify, being "ΕΥ ΧΕΙΡΕΣ, or In the Lord." I send one, the most perfect that we found, which has been noticed by Professor Ross; for the translation of which I am indebted to my friend Mr. R. W. Hay, who accompanied me into these tombs the second time I visited them, in 1849, when on our passage to Cyprus in order to survey that island.

It was in 1847 that we measured the catacombs. Not knowing how far we had to penetrate, we provided ourselves with a clue, the end of which we fastened to the entrance, taking with us candles, matches, instruments, &c., with two seamen to assist. Descending a narrow passage, we entered by a small door into the first chamber, marked A in the plan: it is 40 feet in length, 15 in breadth, average height 5 feet 6 inches, with arched niches over sarcophagi on each side. Some of these latter were in pairs, as for man and wife, parent and child. From the N. end of this chamber we passed on to a passage going westward, marked B; it is 14 feet long, 10 broad, and 6 feet 6 inches high, and has the usual depositories along its sides. Turning again to the N., we entered another passage, C, 61 feet long, 6 feet 3 inches broad, and 5 feet 8 inches high; there being no continuation from this, we retraced our steps to the first or entrance-chamber A, and from its eastern side crawled on all fours through a narrow passage D, bearing easterly: it is a descent of about 5 feet to 13 feet, is only 3 feet wide, and in consequence of an accumulation of rubbish its average height is only 3 feet; it contains no tombs. Emerging from thence, we entered chamber E, 63 feet long, 15 feet 3 inches broad, and averaging 6 feet in height; it has single and double sarcophagi on all sides; also the floor of it, as in the others, has been turned to the same purpose, whereby no space is lost, and on its eastern

side is the tomb on which the above-mentioned inscription was found. From the N. end of chamber E we passed westward into passage F, 29 feet long, 6 feet broad, and 6 feet 6 inches high, also full of tombs; thence, turning N., we proceeded to the end of the chamber G, which has a slight inclination westerly. The length of this passage is about 40 feet, and it is narrow; at the end we came to a full stop, and retraced our steps to the large chamber E, and at its N. end got into another passage H, 42 feet 6 inches long, 2 feet 6 inches broad, and 3 feet 8 inches average height, but in some places it is so low that we were compelled to crawl some yards on our hands and knees, in consequence of the accumulation of rubbish. This led us northward into another passage I, which runs N.W., and from its junction with H is 18 feet long, 5 broad, and average height 4 feet 6 inches; it has a tomb at its extremity, as well as those at each side. Retracing our steps southward, we passed through another passage K, which forms a sort of fork with H, and brings us back to the N.E. angle of the chamber E, from whence we found passage L, 9 feet 6 inches long, 3 feet broad, and 3 feet high; it runs E. into a large passage M, entering which at its N. end we proceeded 117 feet S., breadth 6 feet 9 inches, height 3 feet 10 inches. After passing 79 feet of the 117, we turn to the W. into passage N, 3 feet high, 3 feet broad, running into a beautiful little tomb, nearly square, which, being stuccoed all over and painted black, I call the black tomb O; it is arched, and has sarcophagi at its N and W. sides; it is 9 feet square; the quantity of rubbish in it decreases its height to 4 feet 2 inches, and that only to the top of the arch. In the centre, at its S. side, is a marble doorway, which must formerly have opened on the side of the mountain. We took sketches of this door, and one of a niche over one of the sarcophagi, but we could not arrive at the hard floor of the apartment, although we grubbed with our hands to the depth of 5 feet at the doorway. Leaving this tomb by the same passage that we entered it, N, we travelled S. 38 feet in passage P, an irregular excavation 5 to 10 feet in breadth, the height varying from 4 to 10 feet; the soil was so loose that it threatened to bury us at every step. We crawled out of it to the S.E. through passage Q, 2 feet 6 inches broad, and 3 feet high (having no tombs), which conducted us to R, another irregular chamber, 16 feet long, 4 broad, 3 high, also without tombs; the volcanic earth above was very loose, rendering caution necessary not to disturb it, our backs touching it as we proceeded on our course. At its S. end we were stopped, and, returning to the junction of passages P and Q, on our right hand we found another passage, which trended in a curve E.N.E. about 60 feet, and then took a turn to the N. 40 feet more; we called it chamber S. At its N. end we

came to a full stop; it is full of tombs on each hand, and we were troubled with numbers of bats flying against our candles. We retraced our steps to P, and struck into another passage immediately opposite the one which took us into the black tomb; we named this T; we found it 102 feet in length, taking a N.E. direction; the width of the entrance was 4 feet 6 inches, height 6 feet 10 inches, width at its end 3 feet 6 inches, height 3 feet; it was also full of sarcophagi. We returned from thence to chamber P, up chamber M, through passage L, into chamber E, through passage D, into chamber A, and from thence into the open air, not sorry to see the light of day after being three hours in the bowels of the earth. The thermometer within was 76°; without, in the shade, 68° (May 15th, 1847). These chambers and passages are near 800 feet in length, stretching to different points of the compass; they have been all despoiled, notwithstanding the curses and anathemas which the ancients invoked upon those who should desecrate a tomb; but the presence of golden bracelets, earrings, gems, &c., had such charms for modern spoilers as far to outweigh the terrors of a curse.

Many inscriptions and fresco paintings within have been destroyed apparently from a love of mischief. One tomb, probably that of a woman, has the semicircular arch over it painted with flowers upon a grey ground. It is the most perfect fresco of any within. We may judge from there being many hundred sarcophagi cut in these chambers alone, independently of many others on the side of the same hill, that ancient Melos was thickly peopled, even after the commencement of our era. I have heard of more than one dark deed of murder committed in these receptacles, where the knife has settled a quarrel over an antique gem. Some part of the site belongs to John Saramasko, a kind of antiquarian. The inhabitants call him Joanni Antico; a large marble sarcophagus just below the theatre is his property, in which it is his wish to be buried. We found some cisterns about the site and basements of ancient buildings. In Milo, as in all other ancient towns with few exceptions, the dead were carried without the city walls.

We found few inscriptions in Milo, although I hunted diligently after them; I have copied out those which I have, and they accompany this paper. The greater part of this site was, on April 28th, 1848, covered with corn nearly ready for the sickle; the crops appeared very luxuriant, but plentifully sprinkled with the red poppy.

There are few other antiquities now existing in Milo beyond those I have already mentioned, such as the walls, the theatre, and the tombs; but under the volcanic soil that covers the site I have no doubt many things of interest lie hidden. If we could

establish the fact of a volcano existing some two or three centuries after Christ, one might be tempted to say that ancient Melos was once partially buried in ashes. About $1\frac{1}{4}$ mile S.E. of the Scala is a low range of hills, running N.E. and S.W.; the highest peak is called *Hiera Petra*, which I believe to be 555 feet above the sea-level. There are two or three of the small churches of the country on the slopes of this mount, and nearer to the harbour in this range are some caves facing the S., now used as mairies for goats; there are two windmills near the spot. In one of these caves, to the right as one enters, there is a square hole, which leads to a flight of steps by which we descend to numerous chambers cut in the rock. Many travellers have entered this subterranean abode, and many suggestions have been hazarded as to their former use. The inhabitants give the place the name of *Grotto of Zopiro*, or *Grotto of Zopyrus*. Capt. Graves has a plan of these chambers; they certainly were never intended for places of sepulture. I have unfortunately mislaid the notes I made when within, but I have a pencil sketch of the ground-plan. The tradition of the place is, that this in ancient times was a retreat for the Meliots when pressed by their enemies.

About $\frac{1}{2}$ of a mile N.N.W. of Mount Kalamo, near a small Greek church, are the foundations of an Hellenic square tower. Mr. Wilkinson, late of the *Volage*, took a plan of it, as also of the *Grotto of Zopyrus*. I could find nothing like ancient remains among the ruins of the town on the plain except some blocks of marble and pieces of entablature, in all probability removed for building purposes from the site of the ancient city near Castro. The round and square Hellenic towers found in the different isles of the Grecian Archipelago have engaged the attention of many observers.

Lord Browne informs me by letter that the millstones are quarried at a place called *Rama*—properly *Rema*—that is already mentioned in his remarks. “On the E. coast is a deep valley, with precipitous hills or cliffs on each side; the stone of the cliffs is pink and white, and of the very same description as those quarried beneath. The quarries are in the bottom of the valley or ravine, and are merely underground passages made by the abstraction of the stone. They are probably not more than 20 or 30 feet below the surface, but it is difficult to say.

“There are about twenty holes or entrances made a little on one side of the lowest part of the ravine, to avoid the water running into them;* I think the quarries all communicate with one another. During a great part of the winter men cannot work

* The twenty holes, or entrances, are not quite at the bottom of the ravine; otherwise the water would more easily run in.

from there being water in them. The ground in the mines is of a very crumbling nature, and frequently, when the men are mining and open out a fresh piece, the stones and soil keep falling at intervals, sometimes for a whole day and night; when that is the case, those parts of the mine are left for the time, and on clearing away the loose mass of stones and earth there remains a considerable space or chamber. The mines extend from $\frac{1}{2}$ to $\frac{1}{4}$ a mile under ground, and, although partially under the hills, the direction of them lies chiefly along the ravine; this is probably for the convenience of light and air, as well as taking the stones out. The stones are small and irregular; I forget how many are put into one millstone, but I know a great many are joined together by cement; they are got out of the mines by crowbars and purchases, as the land is naturally of too crumbling a nature to render blasting necessary." The Government derives a considerable revenue from their exportation.

The springs most worthy of notice are on the sea-coast, within the harbour, and about 2 miles S.E. of the Scala. Some of these springs rise up close to the sea margin. The rocks around are of a reddish ferruginous colour. The last time I visited them was in company with Mr. R. W. Hay. We dug holes in the shingle, and placed the thermometer in the spring: the mercury rose to 126° ; the temperature of the atmosphere was 68° ; the day of the month April 28th; the temperature of sea-water 94° , the cause of which was the innumerable hot springs bubbling up from the bottom. I went in, and at the depth of $4\frac{1}{2}$ feet I could not bear my foot over the spring, so hot were they, gushing up with great force. In fact, in one spot I should think that the water at the bottom was of a much higher temperature than that we tried on the beach, when the thermometer was 126° . The rocks are red, as in the Bay of Exhalations at Santorin, in Neo Kaimene, showing the quantity of iron contained in these springs. The French Expedition gives the temperature 55° of Centigrade. Lieut. Strickland, R.N., gives the temperature of these springs on Nov. 27, 1844, 108° , and that of the sea-water 68° ; atmosphere 62° . These springs are salt and acrid. At a short distance inland there are several cold springs in the sand, bubbling up in little round holes; they are also salt. On the S. side of the low range of hills, near and at a very short distance from these little bubbling rills in the sands, is a cavern, which we entered, the country people bringing us lights. At its further end we were conducted to a pool of water some 4 feet in depth, which is salt: the temperature of the water was 84° ; the air in the cavern 74° ; external air 68° . Lieut. Strickland, Nov. 27th, 1844, found the temperature of the cave 85° ; temperature of the water 82° (which is curious); the external air 63° . The farther we advanced towards

the extremity the more sulphureous was the smell. After my bath in the sea I was not tempted to try a second, wonderful as the properties may be which are attributed to these waters. I have no doubt that they are very great, particularly in cutaneous disorders. Olivier and Tournefort both mention these baths or springs, which are known by the name of Loutra.

I once visited and bathed in the hot springs at Thermopylae, which I should think were similar to those at Loutra in Milo, and are also used by people suffering under cutaneous disorders.

Tournefort tells a story of a gentleman of Cephalonia who was cured of an inveterate itch in twenty-five days by bathing in the Milo baths.

Hippocrates cites the case of a patient who was also cured of the same disorder by the same waters.

I collected the waters of these several spots, and took them to Malta to be analysed; but the sun demanded for that process deterred me from making the experiment.

At the small port of Petriki, on the side of the port opposite to Scala, and bearing about S.S.W. from it, there is a ravine, down which fresh water runs until a late period in the spring; in the summer it is perfectly dry. In the large bay or lagoon to the westward of Petriki, something more than 1 mile distant, there is a spring of fresh water, which becomes nearly dry in summer. The inhabitants seem to rely entirely on their tanks for water. They are cleaned out at the beginning of each winter, and it is wonderful what a quantity of sediment is taken from them, probably caused by the rains washing the mud from the tops of the houses, every dwelling having a clay roof. On the site of the ancient city we found several ancient cisterns and tanks with pure good water. One of them, which is capable of containing many thousand gallons, is cased with a beautiful cement, and is situated close to a large fragment of a terrace wall of Cyclopean masonry, about 500 feet N.N.E. of the hill Apollo. Among the ruins of Paleo Khori on the plain there are many tanks and wells; and there are many springs around the adjacent marsh, but they are unfit for the use of man.

Due S. "true" of Scala is a small bay open to the N.E., at the head of which to the S.W. is a small pier under water for the protection of the country boats when the wind is from the N. Also at the head of this bay is a small lagoon of salt water, into the S.W. end of which runs a strong spring of excellent fresh water. In winter no boat can approach it. Formerly there was a small monastery near the spot, the ruins of which still exist. There is a small garden with a few fig-trees, and also one of the small Greek churches on the N. side of the lagoon.

Lord Browne can give me no information as regards the springs

mentioned by Tournefort, and by the French *Expédition Scientifique*, vol. ii. p. 298. Both accounts exactly agree as to distance and locality, 6 miles N. of the "ancienne ville" between St. Constantine and Kastro. The latter account even gives the temperature 28° and 29° Centigrade. Both agree that they are on the sea-shore and under steep cliffs. Now, 6 miles in a direction N. of "l'ancienne ville" takes us well out to sea, even to the N. of the Akrathes rocks. If we could know St. Constantine, which I do not, their position might be ascertained.

I can form no idea where the purging fountain is of Tournefort, 6 miles N. of the ancient town, and between Kastro and St. Constantine. It appears to have been on the sea-shore under steep cliffs. I suspect he must mean the springs on the shore just alluded to.

Pliny mentions the alum of Milo (xxxv. 15). He says, "After that of Egypt cometh that of Melos, of two different kinds, either pure and clear or else thick and gross; the former, if good, is bright like water and white as milk, not offensive to the hands that cut it, yet participating in some sort of a fiery heat; the juice of a pomegranate turneth it black; it allayeth the rank smell of the arimholes. Of alum that is hard and thick and massive there is one kind that the Greeks call Schistos, and the nature thereof is to cleave along into certain filaments or threads like hairs, and of a greyish colour, which is the reason that some have given it the name of Trichitis. However it be named, it cometh of a certain marquesit stone, whereupon they called it Chalchitis, so that it may be called a very sweat of the said stone; but would you know the very best and principal alum of all soils, it is that of Melos, and therefore called Melinum." The French Expedition to the Morea, in its visit to Milo, speaking of the alum, says,—"L'on peut très bien suivre les roches schisteuses de la partie sud, où elles sont encore intactes, jusqu'à dans la partie nord, où elles ont été altérées à point d'être devenues méconnaissables sans cette circonstance, et reconnaître que ces tufs si légers et si friables, au milieu desquels s'exploitait l'alum de plume, ne sont autre chose que les schistes argileuses et autres roches anciennes altérées par l'action des feux souterrains agissant encore aujourd'hui."

The only alum-mine that I could hear of in the island lies about half a mile E.N.E. of Paleo-Khori, or the ruined mediæval city on the plain, on the side of a low range of hills. Near it is a small church on a hillock, called Hagios Giorgios. Mr. Hay and myself descended into the pit April the 28th, having first taken off our coats. The descent was steep and the heat great in comparison with the external air, the thermometer showing 96°. We were at first nearly overpowered by the strong sulphureous vapour rising up from the bottom of the cavern, and in a short time were

drenched with perspiration. From the mouth to the bottom of the lowest chamber the distance may be about 150 feet, and the descent about an angle of 46° ; in places the lowness rendered it necessary to go on hands and knees. We were supplied with candles to enable us to explore the cavern. We passed into two or three chambers of no great size, which have been worked at different times. These chambers are very beautiful, sparkling as it were with gems, and in places covered with a sort of silver frosted work. Striking the sides of the cave with hammers, we broke off beautiful specimens of spiculæ like crystals: in other places it consisted of fine greyish threads, like asbestos. The spiculæ I should imagine were of pure alum: if one wishes for a good specimen it is better to break it with a sharp-pointed instrument. I tried to preserve some of the feathered alum, but it soon lost its beauty after being transferred to the ship. Quartz, in different stages, is mixed with the soil at the entrance. Tournefort and Olivier both give a fair account of the alum of Milo. Dioscorides (lib. v. c. 123) spoke of it, and was of opinion that it hindered women from conceiving.

Mount Kalamo is situated on the S. coast, near the Cape of the same name, and is 505 feet high. It may, in some measure, be called the Solfatère of Milo. Kastro bears N.N.W. about 6 miles from this remarkable spot, and shows out boldly above all the land in its neighbourhood. From the alum-mine to the summit of Kalamo is one hour. Near the top this mountain has a very remarkable patch of ragged, reddish, ferruginous rocks, where we found many fissures, with smoke issuing from them, accompanied by strong sulphureous smells, and much sulphur spread about. This sulphur-mine of Milo appears like a semi-active volcano; the peak of Elias bears about W.N.W. by compass from the peak of Kalamo, distant something less than 6 miles. Lord Browne informs me that sulphur is to be found on the summits of other mountains to the N. of Kalamo: this range of mountains is in the eastern half of Milo, running in a W.N.W. and E.S.E. direction; the vine is cultivated on their slopes.

According to the French account (ii. p. 291), Vauquelin made the analysis of the earth on the summit: he found that in 100 parts there were "65 de silice, 20 d'alumine, 10 oxide de fer, 4 de chaux, 2 de muriate de soude, 6 d'eau, et 1 de perte."

There was not the same violent action going on during our visit to Kalamo as in the time of Tournefort, for he describes flames issuing from the rocks on the coast. Olivier also seems to have been in danger of sinking into the soft burning earth from approaching too near the pretended crater of Kalamo. Our party encountered none of these dangers, and saw no flames,

neither in the face of the rocks, nor on the coast, nor on the summit. Certainly, when sticks were thrust in, they became too hot to be touched by the hand. I have known the same occur on many other parts of the island; for instance, in a ravine near some caves $1\frac{1}{2}$ mile E. of the Scala.

The salt-pans of Milo are at the bottom of the bay or harbour. I never heard of any other. They are near the most vile and stinking marsh I ever saw or smelt, the contiguity of which to the town on the plain serves as a strong reason for its present depopulated state.

The gypsum I have mentioned, but I know not whether it is superior or inferior to that found near Paris. I have seen large quantities of it at the Piræus of Athens, where, as already observed, they use it to clear their wines.

On the W. side of Paleo Khorì Bay, and near Mount Kalamo or Sulphur Peak, there are remains of a modern or middle-age town. It is built on a number of small but very steep hills, and was probably a work of the Venetians. No good water is found among the ruined houses or in the environs.

At the present day "Kastro," or, as it is called by English seamen, the "Crow's Nest" (and by the French "Sifours," in consequence of its resemblance to a town of that name near Toulon), is the principal place of residence of the Meliots. The inhabitants of most islands in the Greek Archipelago, as in Syra, Zea, Skyros, and other places, selected these inaccessible spots for their dwellings in order to protect themselves from their enemies and the hordes of pirates who, from time immemorial, have scourged the *Ægean*.

Kastro is a capital specimen of a village built round a pinnacle; the height is 907 feet above the sea-level. At a distance it has a very pretty, romantic appearance, and from its summit the greater part of the island may be seen. On a clear day there is a very extensive view seawards, which embraces the entrance to the Archipelago, towards which many anxious glances are directed by the Meliot pilots, in hopes of getting employment in their calling. The inhabitants of Kastro, particularly the men, more or less are acquainted with many of the European languages, especially French, Italian, and English, which arises from their serving as pilots on board vessels of those nations. Notwithstanding their thus mixing with civilized people, a more filthy place than this town I never recollect seeing. It is well for them that they live on an elevated spot, and that the winter rains wash down all the filth collected during the summer, as it might share the fate of Paleo Khorì in the plain, and become depopulated.

Geologists call this cone trachytic, and I suppose that it was forced up by volcanic agency during one of the many convulsions

to which Milo has evidently been subject. The colour is a brownish-black: close under it, to the E. and the W., are a few scattered houses, which may be called Cato Kastro. There are also, at a short distance, the villages of Tria Vasala and Tripiti; the first is $\frac{1}{2}$ of a mile S.E. of Kastro, and the latter about the same distance more to the S., and close to the ruins of the ancient city.

The Scala I have already mentioned as being peopled by Sfakians, who seem to be unwelcome guests and the terror of the whole isle; their robust appearance, bold air, and independent manner sufficiently betoken the hardy mountaineer. The population of Milo amounts to more than 2000 souls. The captain of the port resides at the Scala, and the Greek flag waves over a wretched building there dignified by the name of custom-house. The houses of Kastro are built principally of the volcanic stone of the island, of which the walls of the ancient city also are built. Tournefort says, "it is something like pumice, but hard, blackish, light of weight, not susceptible of impressions of the air, and very fit for sharpening all kinds of iron tackle."

Paleo Khori, as it is called, is now in ruins. A few miserable inhabitants still eke out a wretched existence amongst its remains; they told me there were about forty-five families. Nothing can appear more desolate than fever-stricken Paleo Khori, looking at it from the adjacent hills. Fallen walls and houses, roofless churches, and a few melancholy palms meet the eye, whilst a sort of mirage, the exhalation of the neighbouring marsh, hovers over it. Olivier describes it truly (vol. ii. chap. 9, p. 203): "On entering it," he says, "we were struck at seeing houses on all sides fallen in, men bloated, consumptive faces, ambulating corpses: everywhere the image of destruction and death offered itself to our eyes. Scarcely forty families drag on their unfortunate existence in a town which still reckoned 5000 inhabitants within its walls at the beginning of the last century." I found but one church that is still used as a place of worship; it is dedicated to the Panaghia, and near it in an open space are some blocks of marble, having upon them partially effaced inscriptions in Latin and Greek; these fragments must have been carried thither from the ancient site for building purposes. I entered one ruined church, the floor of which had been torn up to despoil the dead, and wrecks of coffins, human bones, grave tags, and other remains were scattered around and piled against the altar. A wretched woman with her offspring crossed my path, who from the ulcerated state of her breasts was unable to nourish her infant. She begged loudly for medical assistance, which I was unable to afford her. I was glad to leave Paleo Khori behind, and gain the open fields.

My friend Col. MacAdam says, "Low down the air of Milo is unwholesome, and from cavernous places sulphuretted hydrogen and muriatic acid gases, mixed with watery vapour, are still emitted; sulphur is sublimated; the water, trickling and dripping, contains sulphate and muriate of soda. Obsidian may be had in shiploads; fresh water is scarce. The white trachyte conglomerate of Milo, as in Hungary, has yielded gold, precious opal, and wood opal."

Milo contains 21,000 stremata of land, of which 10,000 are cultivated. Lord Browne ascertained the produce of the island for the year 1848, which he gives as follows:—

Barley	. . .	40,000 kilo.
Wheat	. . .	20,000 kilo.

A kilo of good wheat weighs about 22 okes; barley, 16 okes; oats, 13 to 14 okes.

Cotton	. . .	1,500 cantars (cantar, 44 okes).
Wine	. . .	1,500 barrels (barrel, 32 okes).
Gypsum	. . .	1,500 cantars.
Salt	. . .	150,000 okes.

			Drach. lepta.			Drach. lepta.		
Millstones	.	1,500	at	3	50	or	7	50
"	.	3,000	at	2	80	or	3	80
"	.	9,000	at	1	70	or	2	20
"	.	20,000	at	0	80	or	1	10
Handstones	.	200	at	9	0	or	12	0

The handstones are dearer, on account of their greater size. If a Greek subject buys millstones he pays according to the first or lesser column; if a Turk or foreigner, according to the second or greater.

Exports:—

			Drach. lepta.		
Barley	. . .	6,000 kilo, at about	3	20	the kilo.
Cotton	. . .	300 cantars, at	16	0	the cantar.
Gypsum	. . .	1,500 cantars, at	5	0	the cantar.
Salt	. . .	150,000 okes, at	0	8	the oke.

The salt at 8 leptas the oke gives the total value of that article at about 2000 Mexican dollars, worth 6 drachmæ the dollar.

All the millstones and handstones are exported; for the quantity consumed on the island, although there are so many mills, is scarcely worth mentioning, as they last so long a time. The government received for the stones 60,000 drachmæ. The largest single millstone is about half a moderate-sized man's body, except those marked handstones. They adopt the plan of cementing a number of stones together to make one grinding-stone, which are got from the quarry by task-work, the labourer receiving so much per cent. on the value quarried.

The salt-pans are let by the government to a contractor, who

makes what he can out of them. These and the quarries were formerly the property of the island; but Otho and his government have now taken them in hand, and farm them pretty severely. Alum has not been exported for many years.

The cotton grown on Milo is the plant, not the tree, "*Gossypium arboreum*." Colonel M'Adam says, that under better auspices he thinks the southern half of the isle may be made more productive. He mentions, among other plants there, the *Rocella tinctoria*, and the *Ornithogalum*, belonging to the natural order of *Asphodeleæ*. The latter is still sold in Smyrna and other places. It is what is known in our gardens as the Star of Bethlehem; in the Levant as doves' dung, its root being like it in shape. It was known in Scripture by that name; and at the siege of Samaria (2 Kings, chap. vi.), "an ass's head sold for fourscore pieces of silver, and a fourth part of a cab of doves' dung for five pieces of silver." It derives its name from *ornith* (ὄρνις, ὄρνιθος), a bird, and γάλα, milk. One species of it has a bulb nearly as big as the human head. I have not met with any trees approaching to the size of timber. There are some few olive and other fruit-trees, and many shrubs.

The temperature of the island is hotter, perhaps, than the greater part of the archipelago. The winters are mild and wet. Lord Browne says that snow is seldom seen even on the peak of Elias, although in the winter of 1848-49 it lay for twelve hours close to the sea. In summer the prevailing winds are northerly. January and February are bad blowing months, with rain, the wind generally from the N., with intervals of westerly and southerly gales. The calmest months of the year are those of June and October. In the spring, after February till the middle of May, southerly winds decidedly prevail.

The question has often been asked, what is the nature of the wild animals on Anti-Milo. Are they goats? are they the ibex? or are they hybrids, partaking of goat and ibex? Lieut. Tower, of the 'Beacon,' shot one or two specimens, and Lord Browne tells me that they were positively the same as the ibex of Crete, some of which were on board the 'Beacon' when the Anti-Milo specimens were procured. That a hybrid may partake very much of its male, and little of its female parent, I believe; for last year, when in Crete, at a place called Gharazo, a female goat was brought to me, with three kids half grown: they were half ibex, and partook very little of the mother. The owner told me that the goat had strayed to the higher parts of Ida, and was recaptured after a time, large with young; also, that around Gharazo the ibex is frequently seen.

There is a very poisonous adder, or snake, in Milo, which, although common, I was unable to get a sight of. It frequently

attacks animals, especially dogs. I saw two of these animals suffer from its bite, and in both cases the poison became infused so powerfully and rapidly that the dogs fell down as if they were shot. However, both recovered. I should be inclined to think that it must be like the "*Κούφι*," "*Couphi*," or deaf adder, of Cyprus, one of which was brought on board the '*Volage*' at Larnaca, the bite of which is terrible, and the poison operates as quickly as that of the adder of Milo, though I have never heard of death occurring, but frequently of amputation being necessary to preserve life. The head of the couphi is cordiform, and the neck much smaller than the head and body: the tail is short and cylindrical; the upper jaw is armed with two teeth, which are very long in proportion to the rest: the colour is ashy grey, more or less dark, with a black zigzag streak along the back, and a range of blackish spots on each side. The scales of the belly are slate-coloured. One specimen brought to Larnaca was 3 feet long and 4 inches in circumference: the one I saw was about that size. Though the inhabitants call it the deaf adder, the handles of their sickles are loaded with bells wherewith to drive it away as they cut the corn. The tinkling of these bells has an odd sound while the reapers are at work: they also wear high boots to protect their legs from its bite.

The earth of Kimolo is still used, as in ancient times, for the cleansing of linen. Pliny mentions it as being used for that purpose; and also Theophrastus and Dioscorides. The '*French Expedition*' (ii. p. 303) has given an account of it:—"Cette terre, abondamment répandue dans l'île, est une argile d'un blanc bleuâtre, onctueuse et molle, résultant de l'altération d'une argile très probablement un peu marneuse; par les mêmes actions chimiques qui ont modifié le sol de Cimolis, comme celui de Milo, où cette terre se rencontre également."

The number of archipelago pilots in Milo may amount to about 146; but their trade has been greatly spoiled by the circulation of the charts constructed during the last thirty years by the different officers employed in the Levant for that purpose by the British Government; and in the course of another three years a complete survey of that most interesting region will probably be ready for the use of all nations. It has been a work of gigantic proportions, and has required the earnest zeal of many men of talent.

None but those who have borne the toil of many successive months, exposed in boats or tents to the rays of a scorching sun, merciless rains, and strong gales, can justly estimate the dangers of a surveyor's life; and, though last not least, the pestilential fevers of the Levant, which have laid many a poor fellow in his grave, or stricken him with ague for the rest of his days. Let the traveller go where he may, amongst the isles of Greece, or along

the shores of the Peloponnesus, Attica, Boeotia, Macedonia, Eubœa, Ionia, Lycia, Cilicia, &c., and many mournful epitaphs to the memory of the departed will remind him that there repose the remains of men cut short in the prime of their existence, who devoted their lives to science and the benefit of their fellow men. I need scarcely add that the present energetic Hydrographer to the Admiralty himself was a sufferer in the same cause, having been severely wounded on the coast of Karamania.

The inhabitants of Milo are, I think, a fairer and a handsomer race than those of the other Grecian isles. I have seen some women who possess great personal charms; but they are much disfigured by the strange style of their costume. On a festal day the wife of our consul was dressed in a jacket of crimson velvet, lined with furs, and reaching to the hip; a white skirt, reaching nearly to the ankle; outside of which another skirt, reaching nearly to the knee; her feet clothed in stockings. In the old town on the plain the women wear the skirt only long enough to reach to the knees, and below that the leg is covered with a thick felt gaiter; over the stocking, which is fastened under the feet by a material of the same stuff, they wear a red or black shoe; a white jacket, with wide sleeves; and head-dress of the same stuff, tastefully wound round the head. This latter dress is something similar to that used in Tournesfort's time.

I have made many inquiries why the Meliots are so fair. The old navigators tell us that in their times freebooters and Venetians constantly put into Milo and the Kimolo roads to carouse and spend their money. Tournesfort describes the women of Argenteria as "arrant coquettes." As the harbour of Milo has been from time immemorial a place of shelter and rendezvous for all European vessels, I cannot help thinking that their crews left a little of their breed behind, as well as their money. Lord Browne was informed by the pilots that such was formerly the case; but whatever may have been the immorality of the Melian women in past times, they are said, at present, to reserve their favours for their own countrymen, or those who are skilled in the Greek tongue.

The wine of Milo, considering that it grows upon a volcanic soil, is not near so good as that of Santorin; it is sweet and mawkish; I never could drink it; whereas that of Santorin is excellent. In Milo they leave the bunches of grapes for several days in the sun after cutting, which has the effect of a partial fermentation, and adds greatly to the strength of the wine, though not to its quality.

In all the islands the education of children seems to be strictly attended to; and Milo is not behind its neighbours in that respect, having a very fair school.

Fossils may be found in great numbers on the northern shore of

Milo, in a soil of tertiary formation. In fact, I have seen them all over the neck of land between Scala and the large bay which is bounded on the E. by Cape Pollonia, and on the W. by Bounda Isla, or farther to the W. by Cape Spilos. Lieutenant Mansell made a large collection of beautiful specimens from that locality. The French in their researches have also added to our stock of knowledge on the fossils of Milo, (*Vok* ii. p. 289).

Professor McCoy, "who visited Milo," asserts that all the fossil shells found in this group are of existing species, which shows that the elevation must have taken place at a comparatively recent date.

The port of Milo has no greater depth than 31 fathoms; that is, the actual port where vessels anchor. Within a line drawn from Scala to the S.W., or across to the little cove at Petrichia, from thence to the N.W. and that part between Cape Kalamaria and the opposite shore, the water deepens to 52 fathoms; and from thence to between Capes Vani and Chidathi to 90 fathoms. It would be hazardous to say that the inner basin, or, in fact, any part, was the crater of an extinct volcano, much as the nature of the surrounding shores may lead one to that belief; but if it should be so, as to its having a chasm on its N.W. side, that might be accounted for by the crust of the cove having been too weak to keep out the pressure of the waters of the *Ægean Sea*.

Sir Charles Lyell observes that, in the case of the great crater at Santorin, the existence of one, and one only, deep and narrow chasm communicating with a central cavity is wholly unexplained by the popular theory of "craters of elevation."

Lord John Browne, when engaged in the coast line of this group, observed no signs of flames or smoke issuing from the cliffs, neither in Milo, Kimolo, nor Polino. He detected heat and sulphur, as already observed, at the N. end of Vouthia bay, close to Pilo Nisi. He also informs me, that although he tented many times at Cape Apollonia, he never once found any ruins that might lead to the supposition that a temple ever stood there. Perhaps an earthquake, or some other convulsion, may have thrown down a part of that coast, and separated Kaloyeros isle from the main.

We saw no inscription of great antiquity in Milo. That the city of ancient Melos was inhabited perhaps some three or four centuries after the Christian era is not improbable, if we may judge from the nature of the inscriptions in the tombs, and from the fact of our having found a large baptismal font amongst its ruins with a cross upon it, doves on each side, and cypress-trees in bas-relief.

In Cyprus we found many inscriptions of the earliest times,—Cuneiform, Phœnician, of the times of the Macedonian dynasty in Egypt, and of the Middle ages.

Speculations have been made as to the physical character of this very curious group in times antecedent to its assuming its present dislocated form; and it may be conjectured that, like Santorin, Therasia and Aspronisi, Milo, Kimolo, Polino and the different fragments around their coasts, were also once one island. The submarine or subterraneous powers which caused the ruin that we now see were doubtless volcanic; and though history gives no account of the group now under consideration having furnished craters of elevation, still, looking at the scorched shores, the circular harbour, the resemblance to a crater near the road to the Kastro, the quantity of volcanic tufa with obsidian embedded in it around (this tufa is a deep straw-coloured looking substance, and contains scales of white mica, with black specks mixed in it), these substances, together with pumice and pumaceous ashes, give reasonable evidences of an active volcano or volcanoes having existed in this locality in ante-historic times. Further, if we look across the Cretan Sea, we shall find that the western end of the noble island of Crete has been pushed up from its foundations by powerful subterranean forces, which have been in operation in past times. Cape Krio, the *Criou-Metopon* of the ancients, and the S.W. angle of Crete, has a clearly defined sea-margin, 37 feet above the present one, as measured by Lieutenant Mansell last year, from whence northwards this ancient line declines to about 20 feet, as measured at Phalasarna, Pondico isle, Grabusa, and Cape Spada, or the *Dictynnaeon Promontoretum*. Turning E. from thence, towards *Rhithymna*, the ancient sea margin gradually declines till it meets the present margin in Suda bay, the difference not being more than 6 feet. This declension is also the same on the S. coast; for as we pass from Cape Krio eastward, as far as the Great Gortynian Plain, there is little perceptible difference in the two levels.

APPENDIX.

XV.—*Extracts from the Journal of an exploring Expedition into Central Australia, to determine the Course of the River Barcoo (or the Victoria of Sir T. L. Mitchell).* By the late Mr. E. B. KENNEDY, of the Surveyor-General's Department, Sydney.

Communicated by the Rev. W. B. CLARK, M.A.

To the Secretary of the Royal Geographical Society.

SIR,

LIEUT.-COL. SIR T. L. MITCHELL, Surveyor-General of New South Wales, having returned from his expedition into tropical Australia, in search of an overland route to the Gulf of Carpentaria, without having ascertained the final course of the River Barcoo or Victoria, whence the expedition returned, that officer proposed to the Colonial government that a further exploration should take place by a party under the command of Mr. Kennedy; and instructions were accordingly directed to that gentleman to pursue the route pointed out by the Surveyor-General. Those instructions are printed in the *Journal of Sir T. L. Mitchell's Expedition into Tropical Australia*, pp. 406-411, published in 1848; and the reader is referred to those instructions and to the following journal for proof of the accuracy with which Mr. Kennedy obeyed them.

Mr. Kennedy having been selected in the early part of 1848 to explore the York Peninsula, found the interval between that period and his return from the Victoria too much occupied to allow him to edit his journal. At his own request therefore, and at the suggestion of Captain Owen Stanley, B.N., with the concurrence of the Colonial Secretary and Mr. Kennedy's personal friends, I undertook the duty of compiling a narrative of the expedition.

The melancholy termination of the late expedition to the York Peninsula in the massacre of the gallant leader, and the deaths by sickness of all his followers but three (the circumstances of which have been detailed by one of the survivors, Mr. W. Carron), has induced me to change my original plan; and in the anxious desire to do honour to the memory of a brave, kind, and intelligent friend, whose calamity has excited the most painful interest in the community, I have thought it better to make as little alteration as possible in the narrative drawn up by himself day by day, than to condense the statement from his journals. I think this will furnish the best testimony to his zeal and devotion to the service; and exhibit, better than any comments, his sagacity, skill, patience, and integrity, qualifications which are essential to successful travel, together with that general amiableness of disposition and that sense of moral and religious obligation which were conspicuous in his conduct.

According to the oral testimony of his companions he had, in an eminent degree, many of those attributes of character, and much of that intelligence, which would have eventually, had it not pleased Providence to close his career, raised him to eminence in the annals of geographical research.

To the credit which he gained by his first explorations must now be added the interest attached to his memory by the unfortunate termination of his career; and if he did not achieve any brilliant exploits in the field, he has the merit of having offered his life as a sacrifice to the cause of geographical science and the advancement of Australia.

The apparent defect in this Journal as regards that important question, the level of the Desert, was the result of an accident.

Sir T. L. Mitchell furnished Mr. Kennedy with the use of the excellent syphon barometer which he had employed in his own expedition to the Victoria; but, on the 24th of March, 1847, eleven days only after the party left Sydney, on suspending the instrument to a tree for the purpose of taking the elevation of a spot on the N. of the Hawkesbury River, which that day had been crossed, the branch gave way and the barometer was broken; and, on returning to Sydney, *no other instrument was found available for the journey.*

It is to be regretted that we have therefore no accurate data for calculating the depression of the Australian continent along the course of the Victoria; and the state of the Desert, as detailed by Kennedy and Sturt, renders it improbable that such information can now be easily obtained.

It cannot but be desirable that the ingenuity of men of science should be directed to supplying some means more portable and less fragile than those upon which so large an amount of calculated altitudes now depends.

Dr. Leichhardt's extraordinary journey to Port Essington would have been infinitely more useful had he possessed the means of levelling on his route. He felt this so much that, on his subsequent attempt to cross the continent, and on setting out on his present journey, he left his barometer in my charge, and took with him a boiling-water apparatus, which I lent him, but which, owing to the saline condition of the waters in the interior, would probably give him inaccurate results.

Having myself used extensively various barometers of the Aneroid construction in taking elevations in Australia, I wish here to point out that if a proper correction could be devised for the effects of temperature, and the instrument could be made equally portable as now with sufficient expansion of the interior vacuum-box to allow of measurements up to 6000 or 7000 feet, and the addition of a vernier to enable accurate divisions of the inch into thousandths to be read off, the Aneroid barometer would be an invaluable assistance to surveyors in general, and to explorers in particular.

Some remarkable coincidences between altitudes ascertained by levelling, and by the Aneroid, prove to me that, in certain conditions of the atmosphere, this instrument even now, used carefully, is *perfect*. But, for an extensive journey over broken ground, in this variable climate, it is not always to be relied on. I consider myself justified in calling the attention of the Royal Geographical Society to this instrument, after having tested it in about a thousand sets of observations, at all elevations up to 2000 feet.

The following Journal throws much fresh light upon the course of the Lower Barcon, and the desert between the Warrago and the Culgoa, and completes the history of all the expeditions up to the present date, excepting only that of the long expected Leichhardt. It commences after the arrival of the expedition at the Wollumbi—the party having left Sydney on the 18th of March.

W. B. C.

April 1st. Proceeded on our journey, crossed the creek at about a mile and a half from our camp of the previous night, and after travelling a distance of 17 miles, encamped by the side of Mr. Bloland's fence at Fordwich (native name *Kimchen*).

2nd. Continued our journey towards Muswell Brook, at a distance of 6 miles, crossed the Jerry Plain's road, near the Cock Inn, and proceeded along the new line of road; forded the Hunter at Mr. Smith's farm, and encamped about 5 miles from the river, after a journey of 16 miles.

3rd. At an early hour our party were in motion, and at 2 p.m. encamped at Muswell Brook, after travelling a distance of 14 miles. Wrote to Captain King respecting a barometer, and purchased some meat for the party.

4th. This being Sunday we remained encamped at Muswell Brook; the thermometer (Fahrenheit) stood in the tent at 102°, being 58° higher than on the previous Wednesday.

5th. Proceeded from Muswell Brook to Seone, a distance of 16 miles, where we arrived at 2 p.m., and where, by the payment of a trifling gratuity, we were allowed to turn our horses into a paddock belonging to a person of the name of Glasfield.

6th. Travelled a distance of 16 miles and encamped at Jack Shea's Water-hole or lagoon, about a mile beyond the "Shetland House" Inn; the weather mild and pleasant.

7th. Continued our journey across the range and through the valley of the Paye, in which is situated the Township of Murrumbidgee. At the distance of a mile and a half from the Township we crossed the steepest part of the Liverpool Range, which forms the boundary of the colony, and encamped in Doughboy Hollow. I was forcibly reminded to-day of the character of the country through which we were travelling, by being told by one of our bullock-drivers that we should find water in the Round Waterhole (a few miles farther on), and that there would be plenty for 2 or 3 days to come. That scanty supply is all the water on the road for a distance of upwards of 20 miles, and on such surface-water we must continually depend, often running the risk of finding it dry upon our return.

8th. Our horses having had a fatiguing day's work crossing the Liverpool Range yesterday, I thought it prudent to encamp at the Round Waterhole, 7 miles from Doughboy Hollow.

9th. Proceeded on our journey at an early hour, and at a distance of 9 miles passed the junction of the Mokai and Peel roads. Encamped at Loder's station, on the Liverpool Plains, after a journey of 12 miles. Thunder-storms were playing about us during the afternoon, and at 8 p.m. a very heavy uno passed over the camp.

10th. Travelled as far as Curribubula, where there is an inn kept by a person of the name of Davis; the distance from Loder's to Curribubula is estimated at 25 miles, but I should consider it nearer 20. Heavy thunder-clouds were observable all day.

11th. Anxious to reach Pringle's station on the Peel, where I was to procure a ton of flour, I travelled, contrary to custom, on this day (Sunday) in order to escape the rain, which appeared to be settling in. On arriving at the turn off to Pringle's, two bullock drivers persuaded me that the road I was about to take was the wrong one, and I did not discover this error till we had gone about 5 miles out of our way. Encamped at the Clay Waterholes, 10 miles from Tamworth, I inquired of a carrier I met here what he would charge for conveying flour 200 or 300 miles on my journey, to which he replied 11. a hundred.

12th. I instructed Mr. Turner to conduct the party to Pringle's by the road we had missed, while I proceeded to Tamworth to inquire for letters, and to procure a native to accompany the expedition. Found a letter from Captain King kindly offering me the loan of a barometer, if I could ride over to his place for it, a distance of upwards of 150 miles. Having completed my business at Tamworth and received the promise of a horse from Mr. Commissioner Bligh, I rode to Mr. Pringle's (17 miles) to meet my party, and to endeavour to make such arrangements as would admit of their continuing their journey while I was absent at Port Stephen's. On my arrival I found Mr. Pringle away from home, but wrote a note to him expressing my wish to purchase of him a cart, horse, harness, &c. and saying that as I was anxious the party should proceed with as little delay as possible, I would give him his own price for them.

13th. Started for Tahlee, the residence of Captain King, taking with me a

men in the hope of purchasing the cart, &c., I required within the first 15 or 20 miles. On arriving at the Commissioner's (Mr. Bligh) I learned to my great disappointment that the horse he had promised to lend me could carry me only 30 miles a day, whereas I required him to perform a distance of upwards of 160 miles before the 16th. Seeing that my only chance of reaching Tablee in time was by riding my own horse, and that in doing so I should be absent from my party a longer period than I considered justifiable, I was compelled with much reluctance to abandon the attempt. I accordingly returned to Mr. Pringle's, where I arrived at 7 P.M., having been caught in a heavy thunder shower. The flour, according to my directions, had been packed in 50 lb. bags, and a canister of powder was placed in the centre of each.

14th. Continued heavy rain throughout the day, which would have prevented our travelling had we been prepared to do so.

15th. The rain of yesterday and last night rendered the ground impassable for drays. Mr. Pringle returned home at noon and I purchased from him a cart, horse, shaft and leading harness, with canvas for a cover. The cart requiring some repairs, our blacksmith was employed during the afternoon in mending it. Mr. Turner took an inventory of our equipment, and we had the horses all branded *P* on the near shoulder.

16th. The blacksmith finished the repairs to the cart and shod the horse. The drays were carefully loaded and preparations made for an early start in the evening. Paid Mr. Pringle for the purchases I had made of him by cheques on the bank of Australasia.

17th. Travelled 18 miles to Mr. Stow's station, at Carrol, crossed the Namoi river, and encamped on the N. side of it. Mr. Turner remained at Mr. Pringle's to bring on any letters that might arrive by the post.

18th. This being Sunday we remained encamped on the Namoi.

19th. Proceeded on our journey down the N. bank of the Namoi, and, after travelling a distance of 16 miles, encamped on the river: weather showery throughout the day.

20th. We continued our journey down the N. side of the river till we reached Mr. Wentworth's head station, when we crossed it, or rather its channel, and thus proceeded to a lagoon 7 miles distant, where we encamped.

21st. Started at an early hour, and after travelling 6 miles, arrived at Mr. Town's Station, where we remained for a short time, and then proceeded on to Dr. Adam's station, where we encamped after a journey of 16 miles. The grass having been abundant at our two last camps, we directly hobbled our horses, but did not tether them. The weather showery.

22nd. Resumed our journey, and at a distance of about 8 miles passed Lady Jamison's station, where I procured from the overseer an aboriginal youth, named Harry, to accompany the expedition; encamped about 15 miles from Dr. Adam's station.

23rd. It rained heavily last night and this morning, but anxious to cross the Namoi while fordable, we continued our journey, and at a distance of about 5 miles passed over to the right bank of the river. Passed one of Mr. Wentworth's stations in the course of the day, and encamped in the neighbourhood of Mr. Doyle's station, after a journey of 15 miles. Showers at intervals throughout the day.

24th. The ground was in such a state this morning from the effects of the rain which had continued almost without intermission during the night that I deemed it advisable to halt for the day, although I did so with much regret, being anxious to proceed with as little delay as possible.

25th. This being Sunday we remained in camp according to custom.

26th. At an early hour this morning we resumed our journey, traversing the Galathera Plains, and after travelling 16 miles, encamped on a creek called Galathera. I had the satisfaction of finding that we had passed rather than

lost by our halt of the two previous days, for the plains were in such a state that, notwithstanding the heat of yesterday, coupled with a frosty night, it was with considerable difficulty that we were able to cross a portion of them.

27th. At starting this morning one of the leading horses broke a hame, which being replaced by a wooden one, we resumed our journey after about an hour's delay. Encamped at the Ten-mile Creek.

28th. The thermometer (Fahrenheit) stood this morning at 34° in the tent. Continued our journey, and crossing a boggy creek, encamped, after travelling a distance of 12½ miles, near Brown's station, at Milli. At 3 p.m. the thermometer stood at 70° in the tent.

29th. Struck the tents and quitting the Settler's road, followed Sir T. Mitchell's track to Camp 89, on the Moomins, where we found much less water than when we left it in December. The track of Sir Thomas's drays was scarcely discernible across Brown's run.

30th. Continued our journey over a very heavy country subject to inundation, and through a flooded box-forest. The water seen in the marsh on our previous journey had disappeared, and on arriving at Sir T. Mitchell's camp on the 12th and 13th of December, we found the channel of that creek dry, and were, therefore, compelled to proceed by a forced march to the Gwydir, which we only reached at sunset. Owing to the heavy nature of the ground over which we had travelled, our draught horses were completely knocked up.

May 1st. Having had a long day's journey yesterday, and knowing that we should have a distance of 27 or 28 miles to travel, after leaving this, without water, we halted to-day to refresh our horses. Mr. T. Brown, who has a station between 2 and 3 miles to the eastward of Sir T. Mitchell's track, called at the camp this afternoon and kindly supplied the party with beef and milk.

2nd. As we had encamped upon the river, about a mile E. of Sir T. Mitchell's track, owing to our having lost it on the plains, we dropped down to it this afternoon, and made preparations for our long journey without water, by distributing our baggage among the horses, so as to lighten the carts as much as possible. About noon to-day it blew a hot wind from the westward, which appeared to be the forerunner of a thunder-storm, but it cleared in the evening.

3rd. At an early hour this morning we commenced our long dry march, the men walking and leading their horses, which were laden with a portion of the contents of the carts. Fortunately the day was cool, but the ground over which we travelled was heavy. At 3h. 30m. p.m. we encamped at Sir T. Mitchell's old camping ground.

4th. Proceeded on our journey in light marching order, but in consequence of our cart-horses gibbling a good deal our progress was slow. At a distance of 10 miles we reached the Gil Gil, but found barely sufficient water in it to refresh our horses, so after an hour's rest we continued our journey and encamped at 5h. 30m. p.m. at a lagoon 1 mile distant from Camp 88.

5th. Having accomplished last evening a distance of 33 miles without water I allowed the horses to feed until the afternoon, and rode down to Mr. Bucknell's station, about the forks on the Barwan and Booni, but did not find any one at home to give me the necessary information. I took 2 natives whom I found at the station back with me, however, in the hope of being able to obtain from them the desired intelligence through my interpreter Harry, and on arriving at the camp was told that Mr. Bucknell's stockman had been there, and said we must cross the Booni at their station 3 miles down, and then proceed to Long David's, 15 miles further out of our way: I therefore preferred trusting to my guides, and we accordingly continued our journey along Sir T. Mitchell's track to the Booni, and had travelled about a mile up the river, when the younger native showed us a part of the channel

nearly dry; here we crossed by means of a few logs which we laid down, and tracing the river back, encamped on Sir Thomas's track on the N. side of it. In the evening 3 natives arrived at the camp from Mr. Bucknell's station, a distance of 5 or 6 miles, bringing a note and 40 or 50 lbs. of beef for the use of the party.

6th. Having dispatched the natives back again with a note of thanks we proceeded with our guides along the track to the Barwan, on reaching which we were engaged for some time in searching for a practicable ford, and at length discovered a very good one about a mile above the place where Sir T. Mitchell crossed. Encamped at 3 p.m. on the N. bank of the river.

7th. Our guides conducted us through the intricacies of the lagoons to Sir Thomas's track from the Mooni, distant from our camp about a mile: there we parted with our guides, whom I rewarded for their good conduct by making each of them a present of a pipe of tobacco, at which they appeared much pleased, and seemed sorry to leave us. We continued our journey along the track through a rosewood scrub, and encamped on a plain 13 miles from the Barwan without water.

8th. Travelled a distance of 11 miles to Johnston's station, on the Mooni, where we encamped; the aspect of the weather made me fear that the rainy season was setting in; for all day long cloud after cloud continued to drive from the S.W.

9th. This being Sunday we halted according to custom.

10th. Proceeded 8 miles up the river and encamped.

11th. Continued our journey, and after travelling 14 miles reached Rouch's, the outside station of the settlers. In the evening wrote to Captain Perry.

12th. Having left my letter at Rouch's to be forwarded, and procured a twelvemonth's supply of grease for our cart wheels, we took our departure from the last station and proceeded along Sir T. Mitchell's track for a distance of 8 miles, where we encamped early in the afternoon.

13th. Continued our journey towards the Balonne, and after travelling 10 miles encamped in an open pine forest. Sent the horses to water at a swamp about a quarter of a mile distant, bearing E.N.E.

14th. The horses having been on the tether all night were taken to water at daylight this morning, and at 5h. 30m. a.m. our party were again in motion. After proceeding about 9 miles, Boxer, one of our shaggy horses, was knocked up, and we were obliged to change him; at a distance of 9½ miles we were compelled to make the circuit of a swamp through which Sir Thomas's road had passed on the previous journey, it being then dry. From this to within 4 miles of Camp 8 the track is only discernible to a native's eye, but with Harry's assistance we were enabled to keep it, and about 5 p.m. arrived at St. George's Bridge; we found a rapid current in the river, but encamped in safety on our old ground at 5h. 30m. p.m.

15th. Two of our carthorses being knocked up yesterday I deemed it necessary to give them two days' rest before proceeding to the 2nd Depot; issued 5 rounds of ammunition to every man in the party, and the regulations I had drawn up at starting. Commenced our night watch this evening.

16th. Three natives were seen by Wall this morning. At 11 a.m. divine service was performed.

17th. Proceeded on our journey and encamped at Camp 9 of Sir T. Mitchell. In the afternoon Wall encountered two natives at a short distance from the camp; one of them spoke two or three words of English, and both appeared desirous of coming up to the tents, but that I could not allow, and on my dispatching two men with fire arms for the purpose of driving them away, they took to their heels.

18th. Continued our journey, and at a distance of 2 miles were obliged to leave Sir Thomas's track, which ran along the bed of the river. In con-

quence of the late floods having rendered the ground impassable we therefore proceeded through the forest ground and came upon the river again, about 2 miles from Camp 10. Followed the track along its bed for a short distance, but were soon obliged to regain the forest ground, and at length encamped between Camps 10 and 83. Passed two parties of natives fishing, but did not speak to them. Just as we were passing the second party one of our carts upset, and the men were engaged 20 minutes in setting all to rights again, but the accident had only the effect of withdrawing them 20 or 30 yards.

19th. At an early hour we were on the move, and after travelling about a mile and a half, arrived at Camp 83, and turned into the track that led to the Marañon. I was exceedingly anxious to see the bed of that river, as I considered it might be taken as a fair indication of the fortune (either good or bad) that awaited us on our journey. On reaching its bank, where we encamped, I found to my great satisfaction that a flood had washed its channel since we last crossed it, and that there was an abundant supply of water. Examined the arms and ammunition. Natives were seen by Wall about a mile from the camp.

20th. Several natives were seen this morning by the men who brought up the horses. Crossed the river, or, more properly speaking, a dry channel, and, after a journey of 14 miles, encamped on the Marañon. Found water in small holes on the surface, but abundance may be obtained anywhere by digging in the sand.

21st. Proceeded as far as Camp 82, a distance of only 9 miles, but owing to the soft and yielding nature of the ground over which we travelled, it proved a fatiguing day's journey, especially to our cart-horses, which suffered much in spite of our efforts to relieve them by constant changes. Water was more abundant here than on our former visit. At about 8 P.M. rain commenced, accompanied with thunder and lightning.

22nd. Anxious to lose as little time as possible, we proceeded on our journey, and, after accomplishing a distance of 11 miles, encamped in a drizzling rain on the water marked permanent in Sir T. Mitchell's map. Wall shot one of the porphyry-headed finches.

23rd. Halted this day (Sunday). Laid down the Victoria on my general map (Arrowsmith's), by doing which I find that the general course of the river turns towards the N.E. bend of one which I first left in 25° S. and 138° E. I hope that the Victoria does not, like the Balonne, split into minor creeks, which flow towards the desert.

24th. This day having been appointed for the trial of some gibbing horses, our progress was but slow, and it was only by taking some of the flour off the drays, and distributing it among such of the pack-horses as could carry it, that we could get on at all. Encamped at sunset at Drysdale Ponds. In those, at which Sir Thomas's cattle watered, there was but a little water, but about a mile to the westward the men found a large and apparently deep lagoon, a continuation, I imagine, of the same ponds.

25th. Continued our journey along the track, and after travelling 9 miles encamped without water. The bed of the river appearing moist we commenced digging a well, but at a depth of 6 feet were stopped by a stiff dry clay. Convinced from the number of birds about us that there must be water in the neighbourhood, I dispatched Douglas and Harry in search of some. The former returned unsuccessful, but was closely followed by Harry, who had crossed our channel and found some in a larger branch of the river, about a mile off, running in a parallel direction. There was no water on the surface, but by digging with his hand he obtained some. Two men with dogs were accordingly dispatched, with which they returned soon after dusk.

26th. Continued our journey, and at a distance of 12 miles found water in a flat by the roadside, at which we encamped.

27th. It commenced raining about 4 A.M. and continued without intermission throughout the day. We accordingly remained where we were, and as there was plenty of grass for the horses, and it would be necessary at all events to give them a couple of days' rest before leaving the Maranoa, I did not regret the delay.

28th. Rain all day, with heavy squalls from the N.E., and every appearance of its continuing.

29th. It rained heavily throughout the night, but cleared up towards morning. The ground, however, being too saturated to admit of our travelling, we remained encamped. The river is less than three-quarters of a mile to the westward of the camp, and there being a fine permanent sheet of water this spot would be well situated for a station.

30th. (Sunday) remained in camp.

31st. At an early hour this morning we resumed our journey, and after travelling 9 miles encamped at the sheet of water, Camp 80. Our horses, although much refreshed by their rest, had, nevertheless, a hard day's journey, to draw the carts over the still saturated ground. At the spot where Sir T. Mitchell left the tomahawk, we found an unusual number of native camps, their proprietors no doubt having been attracted to the spot in the hope of a similar piece of good fortune.

June 1st. Continued our journey, but, from the heavy rain which appeared to have fallen in this direction, the ground was almost impassable. The whole country travelled over to-day was completely saturated, besides being naturally a heavy loose soil. Encamped at a fine sheet of water, 4 miles below Camp 79.

2nd. Arrived at Camp 79; but from the effects of the flood which appeared to have lately taken place in the river, the ascent of the west bank was so steep that we were obliged to encamp and employ the men in cutting a road for the carts. The promising appearance of a creek which joins the river here from the westward induced me to ride up it for 4 or 5 miles, at which distance it still contained water. Its junction with the Maranoa is more imposing than the junction of that river with the Balonne; and I am inclined to think it comes from a distance, and may be a river of some importance higher up.

3rd. Crossed the river, and proceeded as far as Camp 78; found the grass on fire in two or three places.

4th. Proceeded along the track to within a mile of Camp 77, where we halted, to avoid the détour made by Sir T. Mitchell for want of water. All the creeks having their sources in Mount Colby ridge now contain water.

5th. Continued our journey along the track at a quicker pace than usual until we arrived within 2 miles of Camp 76. Here the plains became so soft and swampy, from the late rains, that each cart had to be drawn by four horses instead of two; and, from the delay thus occasioned, we had to grope our way through a scrub in the dark, and did not arrive at Camp 76, at the junction of the deep creek with the Maranoa, until 7 P.M.; all our draught horses suffered much from the latter part of this day's journey.

6th. Halted, as usual, on this day (Sunday), and much need our horses had of rest.

7th. Started this morning with a hope that we might reach Camp 29 (the Dépôt); but finding, at 3½ P.M., that we were 5 miles distant from it in a direct line, and that, in order to reach it, we should have to cross the Maranoa twice, I deemed it advisable to encamp, and set the men to cut away the river bank, for the greater facility of crossing in the morning. Up to this time our progress has been very slow, but it has been greatly impeded by the late heavy rains. A considerable portion of this day's journey has been over what would be in a dry season hard forest ground, but which has been rendered almost impassable by the wet weather.

8th. Proceeded on our journey, and at length arrived at the Dépôt. I shall never forget the mingled sensations I experienced on reaching it, and seeing my tent pitched in exactly the same spot it had occupied the year before, during the five months I remained in charge of the Dépôt. I was much pleased at finding everything in exactly the same state as we left them, and even the few stools and tables we had left behind were untouched. The garden evidently appeared to have been unvisited, except by the birds and rats that had devoured the pumpkins, of which there seemed to have been an abundant crop.

9th. Remained at the Dépôt. Several of the horses were shod to-day, and the different individuals of the party employed in various ways.

10th. Engaged in shoeing the remainder of the horses, and doing other necessary work. Finding, on inquiry, that we had now 3,025 lbs. of flour on hand, I this day granted to the men, in consideration of the toil and fatigue they had been subjected to in driving and walking across such a heavy country as we had lately been travelling over, an addition of 15 lbs. a week till we reach the Victoria. On starting from Sydney, the men joined with the expectation of riding the whole way, except when it came to their turn to drive the carts. At the Peel I found it necessary to add another cart to my equipment, and, from that place to our present camp, three men have been driving, and all of their own accord walking; the horses having been converted into pack-horses, in order to lighten the carts as much as possible, by which means our progress has been materially accelerated. I therefore considered this boon was justly due to them, more particularly as it was unsolicited, and I found from my stock of flour that I could very well grant it.

11th. Crossed the Maranoa, and proceeded, for a distance of 4 miles, along Sir T. Mitchell's track; but although the services of one black boy (Harry) and of every man of the party were put in requisition to endeavour to trace out the return route, our search was in vain; and finding the track we were on bending to the eastward of N., I quitted it, and steered N.N.W., by following which course I came upon the river running nearly E. and W., and encamped in lat. $26^{\circ} 7' 13''$ S.

12th. Crossed the river, and attempted to make Camp 32 by travelling N.N.W.; but at a distance of 6 miles we were met by a pine and brigalow scrub, which compelled us to change our course to N.W. and W.N.W. At 4 p.m. we crossed the river at the junction of a steep gully, and encamped in lat. $26^{\circ} 2' 30''$ S., at which point the river forms a sharp bend from the eastward to S.

13th. Halted, as usual, on this day (Sunday), and in the afternoon took a walk in search of Sir T. Mitchell's track, but without success.

14th. With an idea that we should encounter an ugly country, we started this morning for Possession Creek, and, at a distance of $1\frac{1}{2}$ miles, on a bearing of N., got into a dense brigalow scrub, through which the men had to cut a passage for the carts. Being a few yards in advance of the party, I climbed to the top of the highest tree I could find, and cast my eyes around in search of an open country, or at least an ordinary scrub, but in vain. With little satisfaction, I at length determined upon a direction, by keeping which we got clear of the scrub in a distance of about half a mile: here we fell in with Sir T. Mitchell's track, which we followed to Camp 32, where we arrived only at 3 p.m., so great had been our detention in making our way through the scrub. Two natives were seen to-day by the party; weather cloudy.

15th. Made another start for Camp 33 on Possession Creek. By keeping a N.N.W. course we had the good fortune to meet with ground as open and firm as it was the reverse yesterday, the forest consisting generally of acacia and box, with about 200 or 300 yards of a brigalow scrub. At about 7 miles we came upon the river to the westward of a northerly bend, where

Sir Thomas caught the last glimpse of it before turning westward to Possession Creek. Arrived at Camp 33 at 2 p.m. Error of Index found to-day to be $1^{\circ} 45'$.

16th. Following Sir T. Mitchell's track, we arrived at Camp 34, but found the bed of the creek dry. Having in vain searched for water above and below the marked tree, I determined on falling back to the river, and there leave the party in camp, while I reconnoitred the country to the westward in the direction of Camp 34 Creek; with this view I desired the men to return along the track, and rode on with Harry in search of water, expecting to find some in the river above the junction of the creek. I took a due E. course, but finding, after a ride of 8 miles, that I did not reach the river, but was following the general course of the creek, and it being now near sunset, I returned, and found the party had just encamped at a small water-hole, sufficient to supply our wants for the night. Our position was about a mile and a half to the eastward of Camp 34.

17th. Water in very small holes was found further down the creek. The quantity, however, being sufficient for the supply of the party for a week, I determined on making an excursion to the spot where Sir T. Mitchell marked "Smoke" in the supposed course of the Warrego. The day was therefore spent in making preparations for a week's absence from the camp; and I instructed Mr. Turner to follow Sir T. Mitchell's return track as far as Camp 37, and ascertain the state of that creek, and whether, if necessary, we could obtain a supply of water in that direction. Found the variation of the needle to be $9^{\circ} 5' E.$, and our latitude $25^{\circ} 49' 32'' S.$

18th. Leaving some written instructions for Mr. Turner's guidance during my absence, I started, taking with me Douglas, Jaff, and Harry, on a bearing of $305^{\circ} E.$ of N., intending to make the creek whence Sir T. Mitchell turned back on the 16th June. For 5 miles we traversed an open forest, consisting of pine and iron bark, when we were met by a dense scrub; at a distance of 8 miles the forest became more open. We crossed Sir T. Mitchell's track, running $36^{\circ} E.$, and came upon a creek containing an abundance of water. After resting our horses for an hour, we proceeded on the same bearing, crossing the creek, which appeared to take a north-easterly direction, and, penetrating through a long, dense scrub, arrived at some fine flats, and, after a journey of 17 miles, reached a considerable creek running to the N.E., receiving, I imagine, the water from the flats crossed this afternoon, where we encamped.

19th. Continued our journey on the same bearing as yesterday, $305^{\circ} E.$ For some miles our route lay through much the same description of country as we had traversed on the preceding day; but at a distance of 16 miles we reached the Downs of the Warrego, and at 21 miles encamped upon the creek in latitude $25^{\circ} 29' 18'' S.$ The Warrego intersects fine open Downs, and we found water at short distances in small holes, not to be depended upon in summer.

20th. Followed the river half a mile down on a south course; then crossed it, and ascended a range 7 miles to the westward of the camp, which enabled me to ascertain its position by a round of angles. On taking a view to the westward, I observed smoke in a deep valley about 3 miles, and apparently having a N.N.W. direction. Very extensive plains were observable on the horizon extending from S. to $235^{\circ} E.$ of N. Returned to the Warrego, and encamped half a mile S. of W. of last night's bivouac.

21st. The valley observed yesterday, lying in the direction in which I wished to travel, I deemed it advisable to devote a day to the exploration of it. I accordingly started this morning on a bearing of 294° , in which direction there appeared to be an easy ascent to the dividing range. At a distance of 7 miles we brought the ridge laid down in lat. $25^{\circ} 29'$ in Sir T. Mitchell's chart

to bear S., and, after having penetrated 4 or 4½ miles of very dense scrub, we followed an open box flat to its junction with a deep sandy channel of a river, probably the Nive, and recognised as such by Douglas. We followed this river up in a N.N.W. direction for upwards of 9 miles, but did not meet with a single water-hole, and at length encamped without water in about lat. 25° 26' S.

22nd. Continued our journey up the left bank in search of water; and at 4 miles N.N.E. of our last night's camp we discovered a native well at the junction of a creek with the river, by clearing out which we obtained a plentiful supply of excellent water for ourselves and horses. Continued our search up the channel in a N.N.W. direction, and at a distance of 9 miles from our camp of the previous evening encamped in lat. 25° 16' 10" at a deep though small water-hole, at the junction of a creek from the northward with the river, which latter bore N. of E. Climbed a tree on the top of a ridge, half a mile to the northward of our camp, and took the bearing of several hills; the one I concluded to be Mount Playfair bore 327° to 330°, distant about 8 miles.

23rd. Our camp of the 19th bearing S.S.E. from that of last night, I returned on that course this morning, keeping the river until I arrived at a plain, whence I hoped to obtain a clear passage over the range, but soon found a brigalow scrub, though not so dense as usual. We bored through it for a distance of 10 miles, and crossed the Warrego about a mile above the camp. I have traced the course of this river, or rather of the plains which it intersects, from two or three heights, and find that from lat. 25° to 25° 29' they stretch to the eastward, returning to the same meridian, and at about 25° 45' appear to take a westerly direction.

24th. It commenced raining about 12 o'clock last night, and continued almost without intermission during the day; and, as on my return to the camp I had to find a passage for the carts through a long scrub, I halted this day under the shelter of a piece of bark. Harry shot two ducks.

25th. A bitterly cold morning. Started at 8 a.m., and returning by our track crossed the plains in about 7 miles. At a distance of 10 miles I left the return track to my right, in the hope of escaping the thick pine scrub we had previously encountered, and partially succeeded. At 13 miles crossed our tracks on a flat, just at the entrance of another scrub, which we avoided by following the flat down; and at a distance of 2 miles fell in with them again, and kept them to our bivouac of the 18th, where we arrived at 3h. 20m. p.m.

26th. Returned to our camping-ground in lat. 25° 49' 32" S. near Camp 34; but found that Mr. Turner had proceeded with the party to the first water on Sir T. Mitchell's return-track, in accordance with my instructions to that effect, in the event of the water in the creek failing them. Followed their tracks, and found them encamped in lat. 25° 44' 50" S.

27th. Remained in camp (Sunday). Obtained sight for time and lunar distances.

28th. Proceeded on a westerly course to my crossing-place in the creek of Camp 36, where we arrived about noon, having avoided the pine scrub which we fell in with on our route from Creek 34. Latitude of camp, 25° 44' 14".

29th. Continued our journey along my horse tracks, and at 10h. 30m. a.m. arrived at the Badger Creek. Encamped at 1h. 35m. p.m. at the water-hole in the creek, at a distance of 9 miles from our last night's camp, in lat. 25° 40' 15" S.

30th. Proceeded along the track for 4 miles, and then left it, to avoid a pine scrub; but failed in my attempt to find an open country. At a distance of 7 miles came upon a flat, which we followed up to its head; crossed the dividing range through a pine scrub. I followed my horses' tracks down a flat, falling towards the Warrego. At 4 p.m. encamped without water. As we had observed smoke in the valley to the northward of our camp on two occasions, I

fully expected to find water; but after a personal search was unsuccessful. At 7 p.m. a native approached the camp with a "coo-ée," but made off as soon as he discovered who we were; another proof that there must be water in the immediate neighbourhood.

July 1st. At 8 a.m. our party were in motion; and at 2½ miles we reached the downs of the Warrego; after a journey of 10½ miles encamped on the river at the point where I made it on my return from the Nive.

2nd. Having 2 days' journey to accomplish after leaving this, without water, we halted to-day on the Warrego. In the morning, I took a round of angles from the top of a hill, bearing true 16½ E., distant 1070 yds. Obtained sights for variation at the same time; found our latitude at noon to be 25° 27' 2" S.; var. 9° 40' E. Two kangaroos were shot to-day; one by Harry, and the other by Luff. These are the first we have observed on the journey.

3rd. Cut our way through a brigalow scrub on the top of the range which divides the Warrego from the Nive,* and encamped, after a journey of 11 miles, on a N.W. course, in a flat, by the side of a dry creek.

4th. Removed to the well on the Warrego, about 5 miles in a N.N.W. direction: 3 more wells were dug, from which we obtained an abundant supply of water. Latitude by observation 25° 20' 7" S. Took a tracing of the head of the Victoria, and made preparations for an excursion in search of a practicable route for the carts to the Victoria. The thermometer this morning stood at 8° Fahrenheit after sunrise.

5th. Leaving instructions with Mr. Turner to proceed with the party to the water-hole I had found in a creek at its junction with the sandy bed of a river, I again took Douglas, Luff, and Harry with me, and started off to reconnoitre the country in the direction of the Victoria. As Douglas, who had accompanied Sir T. Mitchell on all his expeditions N. of Depot 2, could not remember the bed of any river resembling the present, except the Nive, to which it was in all respects similar, and as I had crossed a well-watered creek intersecting plains at the position where I expected to fall in with the Warrego, I still thought this river might be the Nive, and accordingly followed it up. During the day it had taken several turns to the eastward, but I encamped in lat. 25° 6' 35" S., about N.N.W. of the depot, without water.

6th. As the course of the river this morning commenced with a sharp turn from the W., I still patiently followed it, in the hope of its preserving that course; but during our progress I found that its longest reaches came more decidedly from the E. Much time was lost this morning in digging for water, our horses not having had any last night. As we proceeded the channel became more bold and rocky in appearance, indicating the vicinity of mountains; and at length, after a journey of 10 miles, we obtained water by digging, in lat. 25° 1' 30" S., our last night's camp bearing about S.W.

7th. As all hope had vanished of this river being the Nive, I ascended a mountain this morning, which bore by compass 103° from our camp, distant 3 miles. I found it lightly timbered, but steep and rocky; evidently an extinct volcano, having its cavity open to the westward. Natives were encamped upon it, which led me to expect that I should find water in the neighbourhood; but although unsuccessful in my search, I have little doubt there is some. The weather being showery I was unable to obtain a round of angles, but observed Mounts Playfair, Pluto, and Hutton, the former bearing 259° 40' by compass, distant 15 miles. Coming again upon the sandy bed of the river at the Mount, I traced it round to the spot where we had encamped, and, in doing so, came upon the tracks of horses and bullocks, confirming what my angles had shown

* This river was afterwards found to be the Warrego, and what I had supposed to be the Warrego, an unnamed creek. — E. H. K.

me, that we were upon the Warrego. Found several native camps along the banks of the river.

8th. Travelled on a bearing of 255° , in order to pass S. of Mount Playfair. At 12 miles passed a well-watered creek, running S.S.W., and encountered a brigalow scrub on the S. spur of the Mount. Encamped $1\frac{1}{2}$ mile from its summit, the bearing 32° . Our camp was on a gully, containing water in shallow holes, evidently the effects of the late rains.

9th. It rained heavily during the night; but this morning I continued my journey, on a bearing of 305° , so as to cross the dividing range and come upon the source of the Nive. In $\frac{1}{2}$ hour we had passed through a brigalow spur on the side of the gully, in which we had encamped, and came upon an open forest-country. Crossed the Crino in an open flat, containing a marked water-course, but with no water, where we passed. Encamped on a creek in lat. $25^{\circ} 2' 19''$.

10th. Continued our journey, and at a distance of 3 miles came upon the rocky brigalow scrub of Sir T. Mitchell: found the ascent rocky and impassable for carts. Picking our way along the top, which was covered with pines and dead timber, we followed down a water-course (the Nive), and encamped at a water-hole at the junction of the Nivelles.

11th. Rode to the brigalow creek, containing water, at its junction with the Nive, distant 7 miles W. of the Nivelles; watered the horses and took my departure for the Gap, on a bearing of 325° . At a distance of 5 miles, found the fall still to the northward and eastward, and therefore kept more in a westerly direction, in the expectation of falling in with a water-course which would lead me to Happy Valley. Ascending a remarkably isolated portion of a ridge which lay in our route, I observed forest-land extending for many miles in a north-westerly direction. Immediately to the northward of the hill was an open flat, through which the creek ran; and although from the distance we had travelled, and the appearance of the country, it was evident I had passed the Gap, I encamped in this flat, there being a good supply both of grass and water. I had just selected a site for our camp, when a hearty laugh made us aware that we were in the neighbourhood of a party of natives; and wishing to ascertain their numbers, I fired a shot; on hearing which they removed to a distance of about $\frac{1}{4}$ mile. Lat. $24^{\circ} 49' 30''$ S.

12th. Concluding that Happy Valley must be about 4 miles W.S.W. of us, and cut off by a high brigalow range, I followed the flat down this morning for about 1 mile, and thus gained the summit of the range. Traced our way along the top to the S.W. till we came in sight of the plains at the Gap with Happy Valley to the southward. Took a sketch and bearing of the limits of the plains; passed Camp 72, and returned to the Brigalow Creek on the Nive. The flat on which we encamped last night appears well watered; and from its character and north-westerly direction the creek evidently flows into the Victoria.

13th. With the view of avoiding the rocky brigalow ridges at the head of the Nive, I started on a bearing of 125° for my camp, in lat. $25^{\circ} 2' 19''$. For the first 7 miles we encountered a good deal of brigalow, and here entered an open forest-country, consisting of box and iron bark. At 10 miles crossed a creek with a southerly direction, with no water in it; and a little farther on came upon another with a westerly course, joining the first. This I followed up, as it gave me an open passage through a scrubby and broken country, in an E.S.E. direction. At 13 miles came upon open forest-land; and at 15, the black boy's horse being knocked up, we encamped, without water, at the head of some rocky gullies concentrating at the head of the Nive.

14th. Continued my course of 125° , and, after passing through an open brigalow scrub for a distance of 3 or $3\frac{1}{2}$ miles, arrived at a creek containing an abundant supply of water. Here we rested our horses for a couple of hours,

and again proceeded through brigalow to my camp, in lat. $25^{\circ} 2' 19''$, having discovered a comparatively clear road for the carts to the Nivelle, escaping the rocky ridges. We should have reached Mount Playfair to-day, had it not been for Harry's horse, which was completely knocked up.

15th. Returned on my track to Mount Playfair, avoiding the pine and brigalow scrubs. About noon it commenced raining, which prevented my getting beyond my camp of the 8th.

16th. Started on a bearing of 130° for the camp on the Warrego, where I had left my party. At a distance of $1\frac{1}{2}$ miles crossed a creek running to the S., with an abundance of water in it; and about a mile farther on crossed the one at which we had watered our horses on the 8th. At 7 miles encountered a brigalow scrub, which threw me off my course to the eastward. At 11 miles made the Warrego; and at 4 p.m. reached the carts; found all well at the camp. The natives had paid them a visit about 2 a.m., but finding the men on the alert had taken themselves off again.

17th. Took observations for variation on a hill N.E. of camp, distant 400 yards; and also took the bearing of Mount Playfair from the same spot. The variation I found to be $10^{\circ} 14' E.$ Removed the camp to a water-hole on the Warrego, in lat. $25^{\circ} 11' 46''$. Observed the distance between ϵ and Antares. The water at this and at the last camp may, I think, be called permanent, consisting of deep holes in sand, at the junction of small creeks with the river from the eastward. The true bearing of Mount Playfair from the hill, near the last camp, is $335^{\circ} 45'$; the magnetic bearing of the centre from the bank opposite to this is 313° .

18th. Remained in camp; received vouchers for 26 birds collected by Wall during my absence, making the total number of birds collected up to this date 53, and of animals 7. Observed the distance between sun and moon, and obtained sights for time; plotted my late route, &c.

19th. Proceeded towards my camp, S. of Mount Playfair, in a N.N.W. direction. At a distance of 2 miles came upon my return tracks, which we followed for some time, and then quitted them, keeping more to the westward, to pass through what appeared to be the most open country. Having succeeded in avoiding much of the brigalow scrub seen on my return, we passed through a short but thick casuarina scrub. I again got upon my return tracks, when we kept a course of 310° to a creek falling to the southward and westward, in lat. $25^{\circ} 7' 8''$.

We found the bed of this creek so soft that it became necessary to tether the horses: water boiled repeatedly at 210° ; thermometer 35° and 44° .

20th. Moved along my return tracks in a W.N.W. direction. At 2 miles passed my bivouac of the 8th, and, crossing a brigalow ridge, came upon an open sandy forest, which we traversed for 5 miles, when we encountered a dense brigalow scrub, through which we had to cut our way. Followed my return-tracks to a creek flowing S.W., in lat. $25^{\circ} 1' 47''$, about $1\frac{1}{2}$ miles S.S.E. of the brigalow ridge mentioned in my instructions. Reached our camping-ground at sunset.

21st. We were detained this morning until $\frac{1}{2}$ past 10 o'clock by Douglas, who lost his way in the brigalow while looking for the horses. Started for the Nivelle and Nive, and at $1\frac{1}{2}$ miles crossed the brigalow ridge, at about $\frac{1}{2}$ mile S. from the place where Sir T. Mitchell crossed it. On attaining the top of the ridge we kept along the upper part of the fall to the Nive, in as northerly a direction as the absence of scrub would admit of. At 5 miles we touched upon my tracks of the 10th; and being now sure that we were clear of scrub, I kept a north-westerly course, until we reached the junction of the Nivelle. The latitude obtained from the double altitude of Arcturus is $24^{\circ} 53' 30''$; the same as charted by Sir T. Mitchell, from an observation of a south star, $24^{\circ} 54' 40''$.

22nd. Proceeded on a W.S.W. course this morning to the water in Bri-

galow Creek, where we encamped at 11h. 30m. At sunrise this morning the thermometer (Fahrenheit) stood at 25°, and at noon 72°. A strong wind all day from the westward, with hot blasts.

23rd. Made a start for Happy Valley, and, with the view of avoiding the scrub we had experienced on two previous occasions, we travelled down the Nive for 2 miles before striking off for the Gap. We did not succeed, however, in effecting our object; for we had to cut our way through a dense brigalow scrub, and did not reach the valley till 4 p.m. It has taken us 6 weeks to attain this point from Camp 29; but my horses were recruiting their strength 3 weeks of that time, while I was absent reconnoitring, and were consequently then, with the exception of three or four, in excellent condition. Not being able to afford flour, a mess of mago was given to the men to commemorate our arrival on the Victoria.

24th. Followed down the water-course, at present containing water in every hole. At 4½ miles got upon the magnificent plains of the Victoria, and, guided by Sir T. Mitchell's survey, I was enabled to cut off all bends, and preserve a westerly course, until we touched upon the river, about a mile S.E. of the first creek laid down by Sir T. Mitchell, as coming from the N., and 9½ miles from Happy Valley. This is undoubtedly the finest country I have seen in Australia, the splendid reaches of water in every bend of the river, and the exquisitely green plains, presenting a delightful appearance. The country abounds, too, in every species of game; emus, turkeys, cockatoos, &c., surrounding us in all directions during our progress. The latitude is 24° 52' 55". Water boiled at 211½. Thermometers (Fahrenheit) in the shade, 44° and 42°.

25th. Remained in camp.

26th. Keeping a westerly course, we crossed the creek of Sir T. Mitchell's first camp from the valley, and at 10 miles encamped ¼ mile E. of the next creek, from the S. near the spot marked on the map "Acacia Pendula;" lat. 24° 52' 52"; a well watered spot. Observed the distance between my Virginis and C, and obtained sights for time. My watch 35° 58" too fast. Seventeen emus were seen in one flock to-day.

27th. Crossed the river, and travelled down its right bank; did not change my bearing all day, and encamped close to the river, after a journey of 9½ miles. The channel of the river here is much divided, and the water is in scattered holes; and I think it very doubtful whether we should find any in a dry season. Lat. 24° 45' 10".

28th. Continued our journey across plains with long strips of scrub in some places; our course was generally W.N.W. At 10 miles came upon the river where it takes a sudden turn to the northward, and at 11½ miles encamped upon its banks. Our course to-day was pretty straight, and although we passed many dense scrubs and much Acacia forest, our road was generally clear. We did not cross the river, but travelled down its left bank (if such it can be called, having no well marked bed but divided channels). Worked my lunar of the 26th instant, which places my camp of that evening in long. 145° 56' 45" E. and lat. 24° 52' 52" S.; this position is 28 miles W. of that given by Sir T. Mitchell.

29th. Travelled over downs in a N.W. direction to avoid the bend which the river here takes to the northward. At about 5 miles touched on its south angle, and then kept a westerly course for 6 miles, and encamped upon the fine reach laid down by Sir T. Mitchell. I imagine the river must have received between this and the last evening's camp some considerable tributary from the direction of Mount Northampton, for the character of its bed is quite changed: instead of clay holes, it has a broad gravelly channel with reeds and long reaches of water. Lat. 24° 37' 10" S., and about 3 miles E. of Sir T. Mitchell's camp.

30th. Continued our journey along the plains S. of the river in a W.N.W.

direction for 9 or 10 miles, when the northern hill of Mount Enniskillen bore S.E.; we then turned more to the northward, through brigalow, to find the river, and at about a quarter of a mile reached it, but here it divided into a number of small dry channels. At about 15 miles in a westerly direction we encamped on the S. bank of the river, which is in this place little else than a broad sheet of sand; obtained water in small holes on the N. side, as well as in a creek three quarters of a mile S.W. of the camp.

31st. Proceeded in a N.W. direction for 7m. over plains; at that distance we came upon the river, but so cut up into small dry creeks or watercourses, that I was at a loss which to consider the main channel; keeping between several of them we encamped at 10 miles on a plain bordering on what I believed to be the principal channel, where there was a long hole containing very old water. The appearance of the country is parched and arid, and it seems to have suffered much from drought.

August 1st. Remained in camp. In looking for the horses this morning the men discovered water in several holes in the neighbourhood, so that there will be no want of a supply on our return; on examining the contents of the carts I find we should have but 1343 lbs. to carry on each horse, were we to leave the carts behind; and as the season is far advanced and I am anxious to make as much progress as possible in carrying out my instructions within the tropics, I have decided on burying them and anything else we can dispense with, so soon as I can find a suitable spot. Natives were seen to-day in a brigalow scrub by the men in search of the horses.

2nd. After rounding an angle of the river we travelled over plains in a N.W. direction for 5 miles, then crossed it and traversed another plain in a N.W. and W. direction. At 12 miles kept a W. course towards the river, and encamped on its N. bank in lat. $24^{\circ} 20' 59''$ S. The evening was cloudy, with every appearance of rain, but at 9 p.m. it cleared up; there was a waterhole in the river where we crossed it, and several where we encamped.

3rd. Finding by this morning's observation that we were in the latitude of Sir T. Mitchell's camp of the 25th of September I sent Douglas and the black boy down the river to try and find out his camping ground. At a distance of 250 yards they came upon horse tracks approaching the river from the northward, which I afterwards examined, and as no other traces were discernible I imagine they must have been upon the site. Wishing to trace the southernmost channel laid down by Sir T. Mitchell I crossed the river, and kept along it for about 5 miles in a W.N.W. direction, but at that distance the scrub became so thick I was compelled to travel again along the N. side and encamped in lat. $24^{\circ} 17' 36''$.

4th. Kept a westerly course over plains of a dry cracked clay, upon which were scattered a few stunted trees; their general height being about 24 feet; had a creek in sight of us to the right all day, and finding at 10 miles that a scrub intercepted us and the branch we had left, we turned to the northward, and at a quarter of a mile came upon the creek which had been running parallel with us. There was no water where we made it, but having found some a short distance up, we encamped in lat. $24^{\circ} 15' 30''$ S. Variation of compass $6^{\circ} 56'$ E. The appearance of the country travelled over to-day was parched, the plains in some places being destitute of all vegetation, and they are, or have been, subject to inundation, as is evident from the numerous shells and muscles to be found in all parts of them; the various channels into which the Victoria is divided in this portion of its course, bear evident marks of the country having suffered from a long drought; water is excessively scarce, and many deep holes are now dry.

5th. Conceiving myself to be now at that point of the Victoria at which it makes a circuitous turn from the northward, or, in other words, at the eastern extremity of the bend alluded to in my instructions, and considering from the

great scarcity of water, and consequently of game, that this would be a favourable spot for burying the carts and such other portion of our equipment as we could dispense with, I instructed Mr. Turner to have 6 months' tea and 44 months' sugar packed in bags for the greater facility of carrying on pack, and to make the other necessary arrangements. With this view I also set the blacksmith to work to furnish each horse with a good set of shoes, which, with a spare set, will, it is anticipated, carry them to the Gulf and back again without injury. The men were instructed to make a search up the creek for water, and also to look out for a sandy piece of ground; whilst, taking Douglas and the black boy with me, I rode in a northerly direction in the hope of recognizing one of Sir T. Mitchell's camps; in this I was unsuccessful, but found that we were encamped upon the northernmost branch of the river, although upon the southern channel of that branch, which here consists of 3 or 4 distinct channels. On my way back to the camp, I selected a spot for burying the carts. I this evening read Leichhardt's lecture, by which I find that there is a probability of our meeting, and that it is his intention to run the Albert up to its source, which is, I hope, in this part of the country. I saw to-day two of the largest kangaroos I ever met with: they were of a yellowish red colour (very similar to that of the native dog), with black faces, and their height when sitting up could not have been less than 7 feet.

6th. The men commenced digging a pit for the carts this morning, but, at the depth of a foot, the soil became so hard, that it was evident they would be unable to sink it the required depth under 3 or 4 days, which time we could not well spare; I, accordingly, selected a more sandy spot, about 250 yards E. of our camp, and 4 men were busily engaged during the day in excavating it, but, on visiting the hole in the evening, I found that at 2 feet from the surface the ground became too hard for the spades, and that our pick-axes would have to be put in requisition; the soil continued sandy, mixed with quartz pebbles; our water was fast falling or evaporating under a temperature of 96° in the shade, and this being a case of necessity I determined upon joining the men in the morning (Mr. Turner being too unwell to admit of his working), with the hope of getting the hole ready by the following evening.

7th. All hands employed in sinking the pit, which was required to be 24 feet long by 11 broad, and 6 deep; worked hard all day, and at sunset had the gratification of seeing it ready to receive the carts.

8th. Buried the carts with the harness, spare trappings, &c., 270 lbs. of sugar, and a sufficient proportion of tea. At 11 A.M., when the pit was nearly filled in, Harry came running to us with the intelligence that the natives were in pursuit of our horses. Having no arms on the spot I despatched two men to the camp for some, but, before doing so, directed the whole party to give a loud shout, which had the desired effect of causing them to desist from their pursuit, and imagining from our voices that we were a large party (the dust raised by the galloping of the horses having concealed us from their view), they thought proper after a time to retire. In the evening the pit was well covered in and trampled upon, whilst Harry rode round the edge of the scrub to guard against our being watched. We were obliged to keep the horses on tether all night.

9th. The loads being new to the men, we did not finally leave our encampment until noon. Kept a S. 86 W. course as near as possible over soft acacia plains, occasionally diverging a little to avoid the scrub. At 4 miles encamped upon the S. branch of the river, where we found abundance of water, but a very scanty supply of grass. Mr. Turner still continued unwell, and another of the party, Luff, complained this morning of a disordered stomach. Latitude by observation 24° 14' 44" S. This branch of the river is here divided into 6 channels; the centre one I should say is seldom dry.

10th. Continued the same course as well as the scrub would permit. The

country travelled over to-day was undulating, of a soft crumbly soil, with here and there open downs interspersed with acacia and rosewood scrubs. From the appearance of the downs, which are strewn with dead timber, and from their being in many places covered with pebbles and fossil wood, it is evident that at some time or another they must have formed one vast scrub. At 12 miles we encamped upon the river from the southward, as laid down by Sir Thomas Mitchell, and found abundance of water; the river, from all appearance, having only lately ceased to flow; its channel is rocky, and the rocks are of a very hard and close-grained sandstone.

11th. Proceeded on our journey in a westerly direction, over a very similar country to that travelled over yesterday, although for the first 8 miles the scrubs were more frequent and longer, but at the same time comparatively open. At 8 miles we crossed a shallow creek falling to the northward, and, at 13 miles crossed a still smaller one with a similar direction, when we came upon open downs covered by the most luxuriant pasture. At 18 miles, having been induced to travel thus far by the fine appearance of the country, we encamped without water on the W. side of an extensive plain; the open passages of ground between the scrubs, seen during the last few days, resembled the cleared ground on the Hunter, where the trees have been killed by stripping them of their bark; from the quantity of dead timber strewn over the ground, it would appear that the scrubs are fast decaying, and their place supplied by plains. At present these newly made plains are of a light and poor description of soil, but as the dead timber disappears the soil improves, from which I think we may infer that they undergo a change for the better, as the absence of wood marks the greater age of the plain. We heard the Gluck Gluck bird spoken of by Leichhardt, seen by Sir Thomas Mitchell's party, for the first time to-day since leaving the Maranoa, where on this journey I only heard it once.

12th. Considering the variation to be 7° E. we kept a westerly course; the clumps of scrub were smaller, and not so dense, as those seen yesterday, and the plains were covered with a most luxuriant vegetation. At 8½ miles we came upon the downs near Yaranigh Lagoons, the chain of which lagoons we crossed shortly after, and found them dry. At 10 miles entered a stony forest scrub, but, finding it too rough for the horses, altered our course a little to the northward, and again came upon the dry chain of lagoons. Riding along the S. side in a westerly direction we found horse-dung, but not being able to discover any tracks, and Douglas not recognizing the spot which is here a dry marsh, running E. and W., we proceeded upon a W.N.W. course to the river, where we encamped; and, singular enough, close to the camp, and about ¼ of a mile from the spot where we first saw horse-dung, more was found; for the latter I am quite unable to account, as Sir Thos. Mitchell crossed the river opposite to a scrub, and kept wide of it, until he encamped upon the 28th of September. Here the banks of the river are clear, and it has several deep channels, in the two southernmost of which a flood appears to have lately taken place. Lat. 24° 16' 33" S.

13th. Followed the course of the river for 3 miles, and crossed it about the same spot as Sir T. Mitchell did, on his return. Kept a westerly course over the most beautiful downs, with here and there a clump of silver-leaf brigalow; the country about here appears to be clad in gold, so thickly is it covered with butter-cups, and other spring flowers. After travelling 10 miles, we arrived at a creek running S.S.W. to join the main river; and as a brigalow scrub confined it on the W. we ran it down, and at 2 miles reached the river, running in a south westerly direction, and here divided into 3 channels. Latitude 24° 17' 34". We encamped upon the middle channel; all three contained water, but the southernmost one was the deepest, and, at its junction with this, about a mile below our camp, there is a fine deep reach.

14th. Proceeded upon our journey, keeping within sight of the northern-

most channel, with a view of travelling as little to the southward as possible, and meeting the S. channel W. of the bend which it appeared to take in a southerly direction. At the distance of a mile, we crossed two deep lagoons, but one of which only contained water, and that apparently not to be depended upon. At about 4 miles came upon the north-western channel at a deep though small reach, and, crossing just below it, rode to a sand-hill which approached close to the river, and seemed to be the north-western boundary of these waters. From the hill the top of a ridge running N. and S. was discernible at a distance of about 2½ miles, confining these waters on the E. and S. side; at 9½ miles we encamped on what I considered to be the centre channel in lat. $24^{\circ} 24' 47''$ S.

15th. Impatient to examine the opposite limit of this most extraordinary valley I left the camp at daybreak with the black boy (Harry), and kept an E.S.E. course towards the highest part of the low range. We crossed the range, which these waters intersect, at 3½ miles, and then ascended a scrubby ridge strewn with rounded pebbles formed of a very hard rock. We penetrated the scrub on rising ground until I thought that we had attained the highest point of the ridge, although the bush was too thick to afford me a good view. This low range appeared to extend parallel to others of the same description, which are connected with it in the direction of N.N.E. and S.S.W. In vain did I look for high land to the southward, or some indication of a change in the course of the valley. The fall was most provokingly evident to the southward. I should mention that, between the camp and this ridge, there are three water-courses, all containing water, but so shallow that it is evident the channel upon which we are encamped is the main one. Harry observed several plants during yesterday's journey, which belong more properly to salt lakes. I thought it worth while, on my return to the camp, to peruse the account of Captain Sturt's expedition, published in the 'South Australian Gazette,' and the result is, that I am convinced that we are now upon Cooper's Creek, described by the natives as having its source, or rather as being divided into many branches, above where they were. The river has been making directly for the point where Captain Sturt turned back on Cooper's Creek, ever since it was turned in its northerly course by Sir T. Mitchell.

16th. With some anxiety lest I should follow this treacherous river too far S. to enable me to carry out the second duty imposed upon me, namely, that of finding a practicable route to the Gulf of Carpentaria, I continued my journey down it, still considering it possible it might take a favourable turn, and that the broken range to the southward and eastward might once be the barrier between Sturt's desert and this, and give rise to Cooper's Creek. At 1½ miles passed a fine reach of water, and at 2 miles passed a lagoon on the right, situated under a low brigalow ridge in the centre of a pretty flat. Keeping the eastern channel of the river on our right, we traversed open plains with here and there a clump of brigalow. At 7 miles sighted two remarkable and isolated hills bearing about S.E., and the point of a brigalow ridge N.W., distant 2½ miles. At 10 miles touched upon the river, here divided into a number of shallow and dry channels, bounded on the W. by the stony brigalow ridge, of the northern extremity of which I had taken a bearing. Scarcely crediting that the river could have thus dwindled away, I left the party on the eastern bank, and rode through the scrub on the ridge, for the purpose of ascertaining if it concealed from view the main channel, but, not satisfied with my search, I sent a man to the point of the ridge, to see if he could discover any traces of it in a north-westerly direction. At 12 miles we encamped between two of its principal channels. The man I had despatched to the ridge returned at sunset, and reported that he had found high ground on the W. bank above where the ridge confines the river, lat. $24^{\circ} 33' 49''$ S.; the course of the river to-day has been about 15° W. of S.

17th. Travelled down the river over a very thinly wooded country; the soil

is a poor white clay, but there is no want of grass, although during the last 3 days it has appeared withered and parched up. We kept between two of the principal channels during the greater part of the day, but, in the afternoon, crossed them and reached a brigalow ridge, which bounds them on the western side. Being satisfied as to which was the principal channel, we turned towards it, and encamped at 13 miles in lat. $24^{\circ} 43' 40''$. The river's course to-day was about S.S.W.

18th. Pursued our journey down the river over a lightly-timbered country, bounded on either side by low brigalow ridges alternately abutting on the E. and W. side of the main channel. The plains had at one time been inundated, and are strewed with spiral shells. These are also intersected by dry beds of small lakes and lagoons; and another remarkable feature is the total absence of trees of any size, except on the banks of a water-course or dry lagoon. We encamped this evening on a small water-hole in the river, which is here split into countless channels.

19th. The course of the river having kept so steadily to the S.S.W., and it being here so divided in its channels, I, last evening, came to the resolution of not taking my party any further down it, "the principal object of the journey (in the words of my instruction) being the determination of the course of the Victoria, and a convenient route to the head of the Gulf of Carpentaria;" I, nevertheless, felt that I could not leave the river untraced in any latitude N. of 26° ; but to attain that point with my party, and afterwards proceed to the gulf, was an impossibility with my stock of provisions, which consisted of somewhat less than 7 months' consumption, at an allowance of 75 lbs. of flour per week: I therefore propose tracing it down to that latitude (26°) with two men, when, if it preserves its present course, I shall be within 2 days' ride of Start's position on Cooper's Creek, and will then leave the river and make directly towards it. On attaining that point, I hope the Government will consider that I have carried out the first part of my instructions, and satisfactorily determined the course of the Victoria. It is then my intention to proceed to the N.W. angle of the river traced by Sir T. Mitchell, and search to the N.W. of that position for a river leading to the northward. Obtained a set of equal altitudes, also sights for time by single altitude; took the distance between \odot and \uparrow and Fomalhaut, and obtained the latitude by north and south stars, $24^{\circ} 52' 51''$.

20th. Left the camp at sunrise with Douglas, Luff, and Harry. At 12 miles halted and had breakfast. In that distance we passed 3 native camps, observable by the smoke of their fires. From the last one 3 or 4 men came out and shouted after us, but they were at too great a distance to admit of my speaking to them, although I was desirous to do so. Before we left the spot where we breakfasted, 3 came up, armed with their spears and nulla nullas, but were so shy that it was a long while before we could get near enough to converse. We exchanged presents, and they appeared to understand our questions as to the course of the river, for they made a sweep with their hands in a westerly direction. They were about 5 feet 7 inches in height, were only scarred across the chest, and all three were deficient in a front tooth. They carried green boughs as emblems of peace, and, as they approached, threw their spears behind them, to show that they were friendly; but it was only when I had taken up a stick and gone through the same ceremony that they would allow me to come near them: they, however, picked up their weapons and held them during the interview. Continuing our ride in a S.S.W. direction, I found, towards sunset, that I must change my course to W.S.W. in order to make the river; and, after a journey of 25 miles, encamped upon a reach of water. This is the first day that the course of the river has taken a direction to the westward of S.S.W. for my length.

21st. Continued my ride down the proper left bank of the river; crossed it

just above where a steep red mount at the north-western extremity of a range abuts on its S. bank; the river here maintains a course 60° W. of S. At 10 miles turned towards the river, and found a reach of water in its channel upwards of 120 yards in width; keeping near the bank in about a quarter of a mile we reached the end of the reach at a point where the eastern bank is strewn with rocks and pebbles, and into which the back water from the river has made considerable inroads. Below this I found the bed of the river dry, and crossed it, expecting to find another channel falling more to the southward, for I could scarcely credit the sudden and rapid change in the appearance of the river. Finding no other, I turned towards the channel I had crossed, and, at 18 miles, re-crossed the river, here dry and divided into several channels, and encamped in lat. $25^{\circ} 11' 51''$. By the unexpected westerly turn of the river I found myself in the evening $48'$ N. of the position I had intended to make, and would have made in 3 days, had the river continued its usual course. I felt much at a loss how to act, for this change extending perhaps for a very short distance, left in doubt that which it was one of the principal objects of my journey to determine. On second thought, however, I decided on proceeding, as it was still possible that the river might disengage in the gulf, although the chances are against it, the only one, indeed, in favour of such a supposition being the rocky nature of its southern bank.

22nd. Before sunrise we were in the saddle, travelling down the right bank of the river. At about a quarter of a mile it took a turn to the northward of W., and was winding through rocky plains, or, more properly speaking, had made a channel through a rocky ridge slightly elevated above the plains; this appeared to me to be the spot likely to determine the course of the river. The range which had abutted on the river to the S. a few miles higher up had receded, but its influence was clearly not yet lost; plains extended on both sides, except on its immediate banks, which, as I have already said, were of a rocky character. The river pursued its westerly course for about 3 miles, when a reach, which had commenced near our last night's encampment, opened out into a fine sheet of water, from 100 to 120 yards wide, with rocky fords similar to those on the Balonne. At 7 miles the river took a short turn to the N.W., and then, as far as I followed, W. by N., inclining to the northward. At 10 miles the reach of water still continued; it was here 145 yards wide, and apparently very deep; it intersected open plains with fair pasture, but with an extremely poor, white, clay soil.

23rd. On a bearing of N. 70° E. I returned towards the camp, feeling perfectly satisfied that it was my duty to follow such a river whatever direction it might take. At $4\frac{1}{2}$ miles I changed my course to N. 60° E., and at 16 miles encamped on the river, having cut off the long bend it takes to the southward.

24th. Reached the camp at sunset, and had the pleasure of finding everything as I had left it.

25th. Conducted the party 13 miles down the river, and encamped on a fine sheet of water; the day was cloudy with a strong wind from the northward; distant thunder was heard in the evening, and rain appeared to fall in the direction of the S.W.

26th. Proceeded on our journey at a quicker pace than usual, in consequence of all the men but two being now mounted. At $12\frac{1}{2}$ miles crossed the river, and, following it down on the right bank, encamped on a noble sheet of water, after a journey of 14 miles. A few jew-fish were caught this afternoon, lighter in colour and longer than those found in the Balonne; we also caught another kind of fish resembling bream, but with a different head.

27th. Followed my tracks, cutting off the southern bend of the river, and encamped on the 10 mile reach, after a journey of 15 miles.

28th. Again got upon my tracks and followed them to where I had last encamped. The river is here 120 to 140 yards wide, with rocky islands; at

a mile below the place where we encamped there is a rocky ford, at which a party of natives had taken up their quarters on my former visit, and where they remained, notwithstanding our vicinity.

29th. Remained in camp and worked the lunars of the 18th instant, by which I made the long. of that camp $144^{\circ} 19' E.$, and the lat. $24^{\circ} 52' 51'' S.$

30th. In the hope that the river was taking a favourable turn to the northward, we started this morning on a westerly course. At 9 miles we neared it, but, at 14, left it some distance to our left, and came upon a considerable river from the N.N.E., with a broad bed and a continuous reach of water about 50 yards across, upon which we encamped, after a journey of 15 miles, in lat. $25^{\circ} 9' 13''$. The last 11 miles of this day's journey had been over a dead flat or plain, subject to inundation; it consists of a white clay, blistered and cracked, and totally devoid of vegetation; this apparently dry bed of a lake or sea is bounded on the N. side by low, red, sandy dunes, and over it are scattered a few dwarf trees of from 6 to 20 feet in height, which appear to have suffered from a long drought: it seems a pity so much water should intersect so worthless a country. I could not help observing this evening how very few birds were visible in the neighbourhood of our encampment; 2 or 3 crows or ducks were all that were to be seen.

31st. Proceeded on our journey; crossed the new river at its junction with an inferior branch of the Victoria, and for about 10 miles kept a course S- to the northward of W. At that distance I found myself on some irregular sandy elevations, the river not in sight, and a low ridge, extending nearly N. and S., in front of me. I then changed my course to S. 15 W. for 2½ miles, and, not finding the river, kept due S. for the same distance, then S. 15 E., and lastly S. 70 E., until I made the river across a plain in 3½ miles, and encamped at 7h. 30m. p.m. on its right bank. The greater part of this day's journey has been over extensive plains intersected by deep fissures and cracks, bare of all vegetation, and of a loose crumbling soil.

September 1st. Continued to trace the main channel of the river through a most dreary desert. At 5 miles the low ridge or range that I sighted in the W. yesterday morning closed in upon the river. It is stony, and covered with a brigalow scrub. The rocks rendered it difficult to travel on the right bank; but, lest the river should discharge any of its waters to the northward unobserved, we advanced slowly over them. Lat. $25^{\circ} 24' 48'' S.$; long., from mean of two observations of ☉ and ☾, and Saturn and Moon, $142^{\circ} 58' 45'' E.$

2nd. At the distance of about ¼ a mile from our last night's camp the stony ridge closed in again upon the river, which here divided into a number of minor channels. Selecting the westernmost one, I traced it for 8 miles; but finding the channel dry, and traversing a desert without any signs of vegetation, I turned to the S.E. and E., and at 4 miles, having crossed a number of dry channels, we encamped, at 7 p.m., on the principal one, here reduced to a few shallow pools. In travelling down the western channel, our party was approached by a number of natives unarmed; they were a fine race of men, little scarred, and wanting two front teeth. We made them presents, and they accompanied us, until we turned to the eastward, which movement appeared to cause them great uneasiness, for they began to coo-coo and talk very loud, evidently desiring us not to go that way. Knowing that the main channel was to my left, I concluded that their camp must be in that direction, and that they were afraid of our approaching it; and, consequently, paying no attention to them, I turned my horse, as if to gallop at them, when they took their departure. On crossing the dry channels, however, we observed several deserted huts on their banks; and I am now inclined to think that their intentions were friendly, and that, knowing that we should not find water for some distance in the course we were pursuing, they intended to con-

duct us to some hole near their camp. This makes the fourth night that our horses have been obliged to go without grass, for not a blade is visible in any direction.

3rd. This morning, before starting, we had a visit from a party of the young men and boys belonging to the tribe we met yesterday; they appeared, generally speaking, to be an open-hearted, good-looking set; and, as their visit was evidently dictated by curiosity, we treated them kindly, and made them presents. They accompanied us for some distance on our journey, the boys laughing immoderately at the movements of the horses, and at about 2 miles quitted us, and we saw no more of them. At 8 miles I sent Luff to look into the channel, on which the natives were encamped, distant about $\frac{1}{2}$ of a mile. He found a little water, but no grass; and we therefore turned more to the eastward, and, crossing the main channel—here more than ever cut up and divided—we encamped upon a small water-hole, which we succeeded in finding, after great difficulty. As we were now within a fortnight's journey of Cooper's Creek, I had 400 lbs. of flour and 70 lbs. of sugar buried, in order to mount all the men and lighten the horses as much as possible. Lat. $25^{\circ} 43' 44''$.

4th. Continued our journey over much the same description of country as we had been travelling over for the last few days.

5th. Remained in camp, and buried 270 lbs. of flour.

6th. Scarcely knowing which to consider the main channel, we pursued a westerly course, with the view of keeping the river between us and the range to the eastward. At 8 miles we crossed an infinite number of channels, and we then resumed a south-westerly direction. At 6 miles touched upon the river below the junction of several of the creeks, and where there is a standing reach of water. At 11 miles came again upon the river, and here it was divided into a number of channels; but in one of them some small, but, I think, constant, holes of water were found. Encamped in lat. $25^{\circ} 54' 15''$. The country travelled over to-day bore much the same aspect as the other portion of the desert through which we had passed; it was wholly destitute of vegetation, but we were fortunate in finding a few tufts of grass in the creek near the camp, which afforded our horses a scanty meal.

7th. Following the main channel of the river, we encamped, after a journey of 8 miles, at two very small water-holes, without food for our horses. The ground travelled over to-day was worse than ever, the horses falling up to their knees at every step. The channels of the river have become very small, and scattered, and contain but little water. Lat. $26^{\circ} 0' 13''$.

8th. Having observed, from the top of a tree, last night, that the course of the principal creeks was to the southward, I, this morning, preserved a due S. course, and arrived, at sunset, at a deep channel, at which, some time previously, a large party of natives appear to have been encamped; it was now, however, dry, and, after a close search, we could find neither grass nor water for the horses. Lat. $26^{\circ} 18' 49''$ S.

9th. Taking Luff and the black boy with me, I rode up the creek in search of water, but found all the holes completely dry. I then crossed over to the last channel between us and the mountains, but was equally unsuccessful. On returning to the camp, I despatched Harry and Welch to examine the creek downward, and several others to the westward; but they found, by the tracks of the natives, that they were travelling from hole to hole, remaining at each only so long as the water lasted. Our horses being now nearly knocked up from want of food and water, but more particularly of the former, I deemed it imperative upon me to fall back, without loss of time, upon the holes we had left on the preceding day. The party started at 1 p.m. and did not reach the camping ground until after dark. I followed at 2 p.m. with Harry, but owing to the weak state of our horses, it took us $6\frac{1}{2}$ hours to reach the camp, distant

only 13 miles. This being the lowest point we attained on the river, I, before starting this morning, marked a tree on the N. side, and cut ^{E K.} on it. In 1847. In our ride to-day, we passed a large tribe of natives that had just arrived from the mountains; they had taken possession of a water-hole, and would not allow two of our party, who tried to look into the creek, to go near it; as it was not the spot where we intended to encamp, the party moved on. At 9 miles, I found Niblett sitting by the side of his horse (old Duzey), who was completely knocked up; he had entered the desert an invalid, and seeing that there was no hope of saving him, and that our own horses would scarcely be able to reach the water, I desired Niblett to shoot him. Arrived at the camp at 8.30 P.M.

10th. Marking the camp ^K 11, we moved towards our position of the 6th; but, although the distance was not above 9 miles, our horses were so exhausted from want of food, that we could only crawl on at the rate of about a mile an hour. I was obliged to dismount and lead mine; and, after a fatiguing day's journey, we at length reached the water and the only patch of grass in the desert. The tracks of the natives have been very numerous during the last 2 or 3 days, and some were observed watching our slow progress over the plains. Eight natives came up to the camp in the afternoon; they were shorter and not so good-looking as the others we had seen, and made a noise in imitation of the crow. They appeared friendly; but, as we took but little notice of them, and would not allow them to go near the camp, they soon took their departure.

11th. This morning about daybreak two natives were observed by the man on sentry speaking along the creek, endeavouring to steal my Theodolite-stand, which happened to be near the bank, but, on being discovered, they took to their heels. In the afternoon the king and all his tribe came up, to whom we made presents. With some difficulty I made them understand that I wished them to let one of the boys come with me; upon which they sent them all away, lest, I suppose, we should take them by force. A curious fact I observed here is, that the men chew tobacco; it is, of course, in a green state, but it is strong and hot. I also observed that they approached us without fear, and completely unarmed. I refer to the natives we have met since our arrival beyond the rocky reach of water, or, in other words, since we entered the desert. Halted to-day to recruit our horses.

12th. Our horses being still unable to travel, we remained in camp; and I availed myself of the opportunity to examine the reach under the range and a dry channel to the northward: this reach is more shallow than those we have seen above, and, as I expected, divides and splits into several small channels, but in vain did I search in them for water.

13th. The horses were brought up, and preparations made to recommence our retreat from the desert; but, finding that they were still wretchedly weak, I removed the camp to the reach, distant $1\frac{1}{2}$ miles to the eastward, to enable them to have a day's feed in the bed of the river before undergoing four days' total abstinence. On the way to the reach, "Harpee," one of the pack-horses, fell down from sheer weakness. I walked, considering it would be cruel to ride my horse in its present state. Marked this camp ^K 11.

14th. On a bearing of 60° E. of N., we proceeded to our camp of the 4th, not being able to keep more to the eastward on account of a rocky ridge which runs parallel to the river, at a distance of from $1\frac{1}{2}$ to 2 miles. At 5 miles we were met by three natives, who, with their tribe, were encamped on the reach to the westward of us, but they evidently did not wish to have anything to say to us, beyond desiring that we should go on our way. Upon crossing

over to the right bank of the river. I observed nearly sufficient feed for the horses in its bed, and we therefore encamped after a journey of 8 miles, as there was no grass at our camp of the 4th.

15th. Continued our journey; picked up the flour which had been buried at our camp of the 4th of September, and proceeded, on a bearing of 26° E. of N. At 9 miles we encamped upon a small patch of grass I had noticed and shown in my survey, distant about 3 miles from our camp of the 3rd. At the camping-ground we passed this morning we disturbed some natives; they hid themselves until we had dug up our flour, but, just before we left, they came up and ordered us away. My horse's strength being somewhat recruited, I was enabled to ride him occasionally to-day. I this morning made up my mind to accompany my party as far as the place where the carts were buried, and thence make the journey to the Gulf of Carpentaria with Niblett and Crocigan, sending the rest of the expedition back to Sydney, under the charge of Mr. Turner. We have now 1620 lbs. of flour, so that I shall be able to start with nearly 8 months' provisions, at an allowance of 10 lbs. per man, and spare 500 lbs. to the returning party, which will be more than sufficient to carry them to the stations. Although I feel great pleasure at the prospect of accomplishing this, the second and main object of the expedition, and consider any risk I may personally incur as nothing compared with the public good, I have my doubts whether I am not putting the services of my men to too severe a test; but they one and all express their readiness to undertake it, and I therefore only hope the result may be proportioned to their deserts. So far as I am concerned, I shall, doubtless, be blamed for taking this step; but no consideration can induce me to return to Sydney until I shall have made every possible effort to carry out the whole object of my mission.

16th. Moved forward to our encampment of the 3rd, upon arriving at which I dismounted with much satisfaction on perceiving the undisturbed ashes of a fire over the hole in which we had buried our flour. Leaving the men to open the pit and get the flour, I consulted with Niblett as to the arrangements necessary to the accomplishment of our contemplated journey to the Gulf, and while in the act of making a memorandum of the different articles we should require, and the number of pack-horses that would be necessary, I was told that the rats had been at the flour. This gave me but little concern, as I knew that all they could have consumed would be but a trifling loss; but in a few moments the extent of our misfortune was disclosed by the discovery that the natives, and not the rats, had been at the flour; they had opened the pit, and had taken away the tarpaulins and bags, together with the shoeing-hammer, &c.; they had emptied the flour and sugar into the hole, strewn a little straw over them, and then filled up the pit again with as much care as we had bestowed upon it, and the better to disguise it, had kindled a fire over the spot in the same manner as we had done. The damage done was great: out of 400 lbs. of flour, 100 lbs. only were collected clean and fit for use, the remainder being half flour and half clay. This loss I had partly anticipated, when, in my anxiety to reach Captain Sturt's position on Crooper's Creek, I had ordered it to be buried, as we had sufficient without it to carry us there and back to Sydney; but my last night's project of an expedition to the Gulf was by it abruptly terminated, for the quantity destroyed was equivalent to 10 weeks' supply, upon which I had calculated, and I did not consider it prudent to attempt the journey with less than 8 months' provisions, that being as short a time as we could expect to do it in. Were I unsuccessful, I knew that I should be censured for having divided and left my party; and to take less than a ration of 10 lbs. of flour per man each week would be insufficient for the extra fatigue and toil to which we should be subjected by day, and the constant watch by night. These considerations induced me to abandon the attempt, and determine upon returning to head-quarters, with the conviction that I had used

every effort in my power to carry out my instructions. Obtained sights for time, and the distance between the Moon and Saturn.

17th. Removed the camp to about a mile N. of our position on the evening of the 2nd, where the water appears permanent, though not to any great depth. Two of the horses were driven in by their riders to-day, with swollen glands and other indications of the strangles. In the course of our march to-day we observed several native fires, although no natives themselves were visible.

18th. Cutting off all bends, we encamped on the river under the rocky ridge, $\frac{1}{2}$ a mile N. of our camp of the 1st. Obtained sights for time, and took the distance between Moon and Saturn, Sun and Moon, and Moon and Fomalhaut; latitude $25^{\circ} 24' 19''$. The river here is divided into numberless channels, our camp being on the westernmost one; this camp I numbered K; it will be easily recognised, being situated in a small bay, formed by the stony ridge which closes in upon the river in latitude $25^{\circ} 24' 22''$.

19th. Remained in camp, and allowed our horses to feed on the best grass the desert can produce. If in any season a blade of grass be left in this sterile region, this would be the most probable place where to find it, on account of the rocky nature of the soil. Obtained sights for variation of the compass.

20th. Continued our journey, and encamped upon our old ground of the 1st September. Received a visit from a party of natives, consisting of three men, a gin, and a little boy; they were quiet at first, but afterwards became very troublesome, and we had some difficulty in getting rid of them. I endeavoured by means of presents, an axe and two shawls, to induce the parents to let me have charge of the boy, but was unsuccessful. Latitude $25^{\circ} 15' 9''$.

21st. At dawn this morning we received another visit from our native friends, whom with great difficulty we kept away from the tents. They were inclined to be very troublesome, attributing our forbearance to fear; but at length we made a start and left them, and, in order to show them that we were friendly, I made the eldest and best-behaved a present of an axe on leaving. On our arriving at the new river, we were again met and followed by a party of natives, who kept adding to their number as they proceeded. Considering it might be curiosity which induced them to follow us, I halted the party, and, dismounting, showed them the men and horses, and allowed them to examine me; after this we again moved on, and I made signs to them to leave us, but in vain. Instead, therefore, of encamping at the junction, as I had originally intended, I deemed it advisable to proceed rather than run the risk of a collision. Blind to all hints and orders, they still continued to follow us, gradually increasing their numbers and becoming more bold and noisy, until at length one fellow threw a nulla nulla at me; we still quietly pursued our journey in the hope of tiring them out, but observing the same native in the act of throwing a boomerang at me, and seeing that all the men were armed with two bludgeons, I considered it time to get rid of them at all hazards. I therefore turned my horse and charged them, when most of them fled; but one lame and evidently troublesome fellow stood, and, raising his bludgeon as if to throw it, dared me to come on. I presented a pistol at him, and suppose the expression of my countenance told him he must go, or be shot, for he soon turned and fled, when, in order to frighten them, we fired two pistols over their heads. It is difficult to explain to the inexperienced how much annoyance a small party must always be subject to from the natives; the kindness and forbearance it is our duty to show towards such savages create in them a degree of boldness and daring not at all times to be checked, I fear, without a severe example. Encamped on the Victoria, about 3 miles to the eastward of the junction.

22nd. Removed the camp about 6 miles further up the river, to a fine reach,

close to which my outward track passed. This being the first spot since we commenced our retreat from the Desert where the horses could be said to have even limited feed, I determined on halting for a day for the purpose of recruiting them. An abundance of fish was caught this afternoon.

23rd. Remained in camp.

24th. Proceeded along our track until we arrived opposite to the lagoon, at which I turned on my last ride. Leaving that close on our left, we moved on to our camp of the 21st August at the rocks which I marked ^KV. Lat. $25^{\circ} 11' 54''$.

25th. Following our former track, we arrived at noon at Camp ^KVI, of the 26th August. Taking into consideration the heat of the plains we were to pass over this morning, I ordered an early start, and we were accordingly on the march at 6h. 30m. a.m. Thermometer at noon 93° in the shade, and at 7 p.m. 73° . Observed the immersion of Jupiter's third satellite at 2h. 50m. 35s. on the morning of the 26th, watch being 12 min. 19 sec. slow on mean time. Lat. $25^{\circ} 6' 31''$; long. $143^{\circ} 45' 15''$ E., by above observation.

26th. Remained in camp.

27th. Proceeded to our camp of the 25th August, on the northern extremity of a fine reach. Lat. $25^{\circ} 0' 8''$ S. Marked this Camp ^KVII.

28th. Returned to the camp of the 19th August, at which I left the party on my last ride, and which I marked ^KVIII. Took observations of north and south stars for latitude, which gave $24^{\circ} 52' 55''$ S., being $4''$ S. of what I had made it in my former visit, and to which I give the preference. Longitude by observation $143^{\circ} 56' 32''$ E.

29th. Cutting off a bend in my outward track, we returned to our camping-ground of the 17th August, which I marked ^KIX. Latitude $24^{\circ} 43' 40''$.

30th. Moved towards our camp of the 16th August. At about 5 miles we came upon a party of natives in a low scrub, who first made their presence known to us in saluting the rear man of the party by throwing a stick at him. They made a great noise, as if to frighten us, but ran away when I turned my horse and charged them. On gaining the open ground, they still continued to follow us, and became very noisy. The rear man being in danger, I desired four men to gallop towards them, and fire their pistols over their heads. This, however, had not the usual good effect; for they kept increasing in number, and followed close upon our footsteps, favoured by the scrub, which in places was very thick. Finding, at a distance of 6 miles, that we could not get rid of them, and that we were approaching a scrub, through which we should have to make our way to the place at which we intended to encamp, I determined on halting for 2 or 3 hours, to refresh the horses. We accordingly did so, and at 4 p.m. resumed our journey, our friends still keeping us company, which they continued to do till we got clear of the scrub, when they deemed it prudent to desist from their pursuit, after having followed us a distance of 11 miles. Encamped on a patch of fine grass in the centre of a plain. The zodiacal light was most beautifully apparent this evening till 8 o'clock, extending nearly as high up as a Serpents.

October 1st. At 6 a. m. we were on the move, and encamped on the E. side of the reach, near our position of the 14th August. Marked this camp ^KX. Lat. $24^{\circ} 24' 49''$.

2nd. Continued our journey; and at starting hoped to be able to keep on a plain between the two channels the whole way to our camp of the 13th

August. We found it, however, intersected by so many channels that we were obliged to alter our course to avoid them; and, in doing so, came upon my old track, along which we kept, with but a slight deviation, until we arrived at our former camping-ground, where we found the water-hole dry. Whilst Mr. Turner was engaged in searching along the channel for water, we received a visit from a party of natives, consisting of three men and a boy. On my asking them for water, they at once told me to follow them, and they would show me some, which they did; and, that I might perfectly understand that we were at liberty to take some, the old man of the party led me down to the brink and bid me drink. As a return for his kindness, I made him a present of a knife; and also gave his companions such things as we could dispense with. I was much pleased with them; and they were, without exception, the most friendly and best-behaved natives I met with on the journey. They remained with us till sunset, when they took leave, asking permission to visit us in the morning, which was, of course, readily granted. I, however, determined not to remain, lest we should inconvenience them, and therefore ordered an early start on the morrow (Sunday), though contrary to my usual custom to travel on that day. We obtained from this party some useful words, which are correctly written according to their sound:—River Victoria, "Barcoo;" water, "ammo;" grass, "oo-to-noo;" fire, "poor-die," &c.

3rd. Before sunrise our friends made their appearance, and I entertained them at our fire, it being a cold morning. They were much amused at seeing the men load the horses preparatory to a start; but their equanimity was temporarily disturbed by one of the horses who would not allow himself to be caught, but galloped down to the water, near their camp. We were visited by only one gin, whose curiosity to see Harry induced her to come up to the camp just before we left.

We have had frequent opportunities of observing that the women of the Desert are not deficient in the principal charm of their sex, viz., modesty. At $\frac{1}{2}$ past 6 we took leave of our kind host, who expressed a hope that he should see us at some future time. We proceeded about 5 miles further up the river, and encamped close to a tree. I marked the camp ^K XI. Lat. $24^{\circ} 17' 16''$ S.

4th. Proceeded to our old camping-ground; the first within the limit attained by Sir T. Mitchell on the previous journey, which I marked ^K XII.

5th. Keeping along the flat of Yarrumb's lagoon until we got upon our track, clear of the rocky ridges; along this we proceeded a distance of 20 miles towards the river from the S.E., laid down by Sir T. Mitchell, when we encamped without water. The day having been cool, we accomplished the journey, 20 miles, without fatigue to man or horse.

6th. At 6 A.M. we were on the move, and arrived at our old camping-ground on the S.E. river at 8h. 30m. A.M. I marked this Camp ^K XIII. Lat. by north and south stars $24^{\circ} 15' 47''$. [12th Aug. $24^{\circ} 16' 33''$.—C.]

7th. Kept the track until we arrived at our camp of the 9th August ($24^{\circ} 14' 44''$), where we found the water-hole dry. Having ascertained, however, that there was a sufficient supply of water about $\frac{1}{4}$ mile further up the river, I left the party and proceeded with Welch and the black boy to the spot where we had buried the carts, about 5 miles E. of our present position, which I had the satisfaction of finding undisturbed. A native or natives had evidently been sounding in two places that very morning, and had left, probably to obtain assistance. Determined, therefore, to be beforehand with them, we left the camp at sunset, commenced opening the pit at 8 o'clock, and by 12 P.M. had everything out of it. The soil being dry, we found nothing the worse for two months' interment.

8th. At daylight the carts were mounted and loaded; and at 8 A.M. we moved forward to our camp of the 4th August [lat. $25^{\circ} 15' 30''$.—C.], which we reached at 11. On arriving at it we found ourselves in the company of a party of natives, who appeared greatly alarmed lest we should remain there; and it was not without some difficulty that we obtained permission to do so. I made them a present, but finding that they were becoming troublesome I got rid of them. In the evening some of them returned, making signs to us to leave, upon which I ordered them off. To this they paid no attention; and I therefore sent three men towards them, when they took to their heels. Our horses made an end of the water at this camp; but there is a large hole about $\frac{1}{2}$ of a mile higher up, which I should think is seldom dry.

9th. At 6h. 30m. A.M. we left our encampment, and keeping the right bank, or rather plain, of the river, passed our camp of the 2nd August, near which we observed two natives, which convinced me that there was water in the neighbourhood. Moving on along our track of the 2nd August, we found water at 13 miles, and encamped near the spot at which we crossed the river on that day. Although the holes are not deep, there are several of them; and as the rainy season may be expected in another month, I think it not unreasonable to suppose that water may in most seasons be found along this channel, judging by its appearance on this our second visit. If I were bound hence down the Victoria, I would keep this channel for 20 miles further, and then strike off due W., to meet the opposite side of the bend.

10th. Remained in camp.

11th. Proceeded along my outward track to our position of the 30th July, passing our camps of the 31st of that month and 1st August, at which there was still water. On reaching the site of our former encampment we found the water-holes dry at which we had then watered; but Harry and Costigan found water in the southernmost branch of the river, or rather a brigalow creek running parallel with it.

12th. Wishing to avoid the scrub we had encountered on our outward track, we kept wide of the river. Rounding a point of scrub on an E.S.E. course, we kept more to the eastward, and E. by N., until we came again upon our track about $\frac{1}{4}$ mile from our camping-ground of the 29th July, on the ranch, at which we arrived at 11h. 30m. A.M. We found the water had fallen 3 feet since that time. Natives were seen in the afternoon, but they did not approach our camp. This day's journey was almost entirely over open plains.

13th. Kept the track until we reached the S.E. angle of the river shown in Sir T. Mitchell's map. Then leaving it to our left, took an E.S.E. course until we reached the river, beyond the bend about half a mile above our former camp; finding water in two holes, and not wishing to pass our second camp from this before Saturday, on account of some observations I wish to make then, we encamped at 10 A.M. The plains or downs between this and the ranch are covered with fine pasture, and being hard, sound ground, are well adapted for sheep or cattle. At sunset equally weather set in from the westward, accompanied with a heavy thunder-storm and rain; but at 10 P.M. the wind shifted to the S.E., and the remainder of the night was fine.

14th. Continued our journey along the track to within $\frac{1}{4}$ mile of our camping-ground of the 27th July, when, leaving it on our left, we made the river about $\frac{1}{4}$ mile beyond it, and encamped on the east side. The water has greatly fallen since we were last here; but there is still a little in almost every hole. Rain has evidently fallen here lately; for the plains are covered with the most luxuriant green grass.

15th. Moved our camp to the ground we occupied on the 26th July. Obtained sights for time, and observed the distance between the Moon and Saturn, Moon and Fomalhaut, and Moon and "a Pegasi."

16th. Made observations for latitudes, the result (mean of North and South

Stues), being $24^{\circ} 52' 45''$, determined to be $24^{\circ} 52' 52''$ on my former visit. Observed the eclipse of Jupiter's satellite at 2h. 35m. 52s., and obtained sights for time by single altitudes of the sun. Proceeded to our position on the 24th and 25th July, keeping the track the greater part of the time. We found an abundant supply of water at this camp, although it had fallen 3 or 4 feet since we were here before, and the channel will be dry in another month unless rain comes in the meantime.

17th. Remained in camp. It blew a gale of wind from the eastward throughout the day and night.

18th. Bade adieu to this plain of the Victoria, and kept our track towards Happy Valley. On arriving at that point of the watercourse, at which it has a sharp bend from the northward, and being on a sandy ridge similar to those on the Nive, I struck off from the track, and kept an easterly course through the most open ground we could find until we made the Nive, at about the same spot at which our outward tracks had quitted it, and about $1\frac{1}{2}$ miles below the junction of the Brigalow Creek, laid down by Sir T. Mitchell. Took up our old position at the junction about noon. Found the water falling fast.

19th. Removed the camp to the junction of the Nivelle, a short stage, but being uncertain as to where I might next find water, I thought it prudent to halt there, and prepare for a forced march; the hole was dry, but we obtained sufficient water by sinking three wells.

20th. Made an early start, and at 11 a.m. reached our camp of the 20th July; but finding no water in the creek, pushed on to one 7 miles further, at which I had bivouacked twice, and had always found abundance of water. On reaching it, however, we found the holes perfectly dry. Having travelled 20 miles, we rested our horses for a couple of hours, and at 5h. 30m. p.m. again moved on, following the track by moonlight. At 10 p.m., after having travelled a distance of at least 30 miles, we made our old camping ground near Mount Playfair, when the horses could scarcely be restrained from rushing to the hole, at which they had formerly watered. It now, however, presented the appearance of a hole that had not contained water for months, being perfectly dry, and full of dead leaves; and we were consequently obliged to keep the horses on tether all night.

21st. At 5 a.m. we resumed our journey, and reached our camping ground of the 17th and 18th July on the Warrego at 9h. 30m. Here we found, as I had anticipated, an abundant supply of water. This hole and that on the Nivelle are the only two between our present position and the reach on the Victoria to be depended upon in a very dry season, although I should think this part of the country is very seldom visited by such a drought as prevails at present, judging from the healthy appearance of the trees and the luxuriance of the pasture on the Victoria plains.

22nd. Allowing the horses a day's rest after their long march, I rode this morning in a south-westerly direction to the range laid down by Sir T. Mitchell on the W. side of the Cano, with the view of ascertaining whether there is a watercourse of any importance between it and the Warrego. After boring through the very dense scrub which crowns the dividing ridge, I came upon an open forest country, and crossed a number of shallow creeks and flats, in which the holes were dry. Having reached the range, and satisfied myself that there was no very considerable creek between it and the Warrego, I returned to the camp; but, instead of coming back through the scrub, kept it on my right, and rode in a north-easterly direction. On this course I observed an opening in the scrub, through which I obtained a clear passage to the east tracks. In going from the Warrego to Mount Playfair the thick casuarina scrub might, therefore, be avoided by turning to the left just before entering it. The night being cloudy, I was prevented from observing the eclipse of Jupiter's satellite.

23rd. Removed the camp to my depot of the 4th to 16th July, where we found a plentiful supply of water, as well as at the hole half a mile lower down on the S. side. It commenced raining at sunset, and continued almost incessantly throughout the night.

24th. The rain continued till noon, when it cleared up. In the evening there appeared to be a very heavy thunder-storm to the northward of us. Conceiving it desirable to ascertain whether the Warrego was a southern water flowing into the Maranna or a western one flowing to the Desert, I determined upon tracing its course for 3 days.

25th. Taking Luff, Douglas, and Harry with me, I left the camp early this morning to follow the course of the river down; but on my arrival at the wells I found so much ruin had fallen lately that I resolved to return, and take the party with me, and run the chance of its joining the Maranna. At 1 p.m. I again left the round water-hole with the party, and at 3 p.m. encamped near the wells.

26th. Continued our journey down the Warrego, and, at about $5\frac{1}{2}$ miles on a southerly course, lost sight of the river, and found ourselves on the top of a pretty high ridge. Finding an easy descent, we followed a water-course down in a south-westerly direction, between brigalow ridges, until, at 7 miles, we reached Kangaroo Creek in lat. $25^{\circ} 33' 24''$. Its bed was broad and sandy, but dry, where we made it. Luff and Costigan found water about a mile W.S.W. of the camp, to which the horses were taken.

27th. Proceeded on a course a little to the westward of S., but finding that we must keep more to the W. to make the river, we gradually altered it until we crossed it at about 3 miles from last night's camp. Cutting off an angle, on a S.S.W. course, we touched upon the river, where there was a good water-hole. On the right bank of the river there was a clear elevation, from which I took the bearing of a ridge N. 77° E., and observed the Warrego in the opposite valley. At about 18 miles arrived at the junction of Kangaroo Creek with the Warrego in latitude about $25^{\circ} 35'$. Not finding any water, I sent the party back to the last hole we had passed, and rode 5 or 6 miles down the river; it preserves an almost due W. course for that distance, when it receives a sandy tributary, probably the Nive, and takes a southerly course. I returned to the camp, undecided as to whether I should continue to trace the course of this river or give it up as a westerly water. Lat. $25^{\circ} 30' 6''$. A single native was seen this evening; he came to his guniah with two or three cockatoos, but departed on finding us in possession of the spot.

28th. Encouraged by the southerly turn I observed in the river last evening, I determined upon tracing it, so long as my stock of flour would admit of my doing so. Having left a chisel and other presents in the tent of the native I saw last night, as an acknowledgment for the water we had used, we proceeded on our journey down the river, and at noon halted, without water. Sent a man down its bed in search of some; and, after giving the horses a couple of hours' rest, moved on to water in lat. $25^{\circ} 40' 36''$.

29th. Continued our journey down the river, which at first took rather an easterly turn. At 9 miles, on a general southerly course, encamped at the junction of a creek from the eastward, where water may in all seasons be found. Lat. $25^{\circ} 51' 22''$. Marked this camp ^KXIV. At our encampment of last night there is a reedy hole which in a favourable season must contain a fine sheet of water; and, although the extreme heat of the weather and the heavy nature of the ground would not admit of my making a close search, I feel sure that this part of the river is well watered.

30th. Travelled down the river on a general S.S.W. course. At about 8 miles crossed Yu-Yo Creek, and followed it down to its junction with the river under a brigalow ridge on its left bank. Encamped on the W. side of the

river, at the junction, in lat. $25^{\circ} 57' 55''$. Marked this camp ^KXV. We disturbed a party of five natives in the Yo-Yo Creek, who ran away at first, but returned after the tents were pitched. Taking Harry with me, I went up to them, and found them to consist of an old man, his gin, and four sons; they were a most orderly set, but at first to everything we said to them they replied Yo-yo, by which perhaps they meant to signify their assent to all our interrogations. We exchanged presents; and, although I was not able to obtain much information from them, I found that their language was the same as that of the natives of the desert. At sunset we parted company, we returning to our camp, and they to theirs on the opposite side of the river.

31st. Obtained distances of moon and Mars, and sun and moon, also sights for time. Took Welch and Harry with me to the summit of a ridge bearing S. 70° W., distant from the tents $3\frac{1}{2}$ miles. The view was not extended, but Mount Boyd bore E. 5° S., and a more distant range N. 80° E. In the evening our Yo-yo friends paid us another visit. I showed them the camp, and gave them some bread and tea, but they used both very sparingly. I have remarked that all the natives we have met are scrupulous in tasting anything

we give them. I showed them the tree marked ^KXV., that in case any one should make inquiries they might be able to show it to them, as the natives of the Balonne did to me on a similar occasion. They all seemed to say that there was plenty of water to the southward, but none to the westward.

Nov. 1st. Following the easternmost branch of the river, we continued our journey down it. At 5 miles the river divided into a number of small channels; but, a mile further on, we found abundance of water in the easternmost branch. At 9 miles, a brigalow ridge closed in upon the river; and, at 10, we encamped; the excessive heat of the weather rendering it impossible to travel after 12 o'clock without great injury to the horses. We obtained water in a rocky hole off the river, but about $\frac{1}{2}$ a mile up the eastern channel there was a fine reach of water. The country travelled over to-day was open, and would make an excellent cattle station. Lat. $26^{\circ} 6' 30''$ S.

2nd. Continued our journey down the E. bank of the river, over open flats and a forest country. At 8 miles came upon an open acacia forest, running along the side of a ridge; but the top being too thick to penetrate, we ran it down to the river, and encamped after a journey of 10 miles. The river is here divided into several channels, but contains a reach of water at the point of the ridge about 500 yards below our camp. Thermometer (Fahr.) 104° in the shade. Several thunder-storms were observable passing to the northward, but no rain reached us.

3rd. Moved onwards, but as the river here seemed to take a westerly turn, and from the latitude we were in I expected the reverse, I kept a southerly course so as to cut off the bend. At 5 miles got upon table land, and travelled through thick acacia scrubs, and over small plains which appeared to have been cleared of scrub by fire. At about 15 miles saw plains, and a scrubby ridge bearing S. 85° E., and encamped after a journey of 21 miles without water, but with the fall of the ground before us. Thunder-storms were flying about all day.

4th. Much against my inclination I felt bound to steer towards the river, and not continue my present course, in expectation of meeting it; and, accordingly, I travelled W.S.W. through thick scrubs and over sandy ground. At 3 miles we were obliged to take the horses out of the carts, and the jacks off the horses, and lead them to water, leaving two men in charge of the property. In 14 mile made the river, and about 3 miles down it found abundance of water. After allowing the horses to drink, the worst were left with Harry, while the remainder went luck for the carts, and at 11 A.M. we were established at the water. Natives were seen at some distance from the camp.

burning the grass, and in the evening I could hear their voices in our neighbourhood. Latitude, $25^{\circ} 31' 0''$ S.

5th. Continued our journey down the left bank of the river, which here takes a great turn to the eastward; at 3 miles crossed a flat, on the E. side of which I observed the line of pine-trees seen the day before yesterday under the plains. At 4 miles met six natives with whom I stopped to speak, but could obtain no information from them; hearing me ask about water they followed me, and one of the party acted as guide to a fine reach very similar to those on the Balonne. In return for his civility I gave him an old powder-horn, and bade him and his friends adieu; but they followed us for a mile or two before they finally left us. They were as ill looking a set as I have met with, and the young man who acted as our guide had in his belt the blade of a knife, which Niblett recognized as the property of W. Bond, and which had been lost at the depot on the Maranoa. After travelling about 10 miles, we encamped at the junction of a deep creek with the river, which to-day has preserved nearly a S.S.E. course; the night being cloudy prevented my observing the latitude.

6th. Continued our journey, and endeavoured to keep a southerly course; but had great difficulty in doing so, in consequence of the scrubby and soft nature of the ground. At 8 miles observed a fall of ground to the S.S.E., and therefore preserved the same course as we had been previously keeping, although the cart-horses were nearly knocked up by the extreme heat and soft ground. At 10 miles observed smoke in front of us bearing S.S.E.; but after going $1\frac{1}{2}$ mile further, the wretched horses were completely exhausted, and we were obliged to rest for an hour. In the meantime I rode on with Harry; but not succeeding in making the river as soon as I had anticipated, and the ground being heavy, I decided on returning to the carts and conducting them to the nearest point of the river. Accordingly, keeping S.S.E., at sunset we descended a gully and encamped upon a creek containing water, in the neighbourhood of which there was excellent pasture for the horses.

7th. Moved the camp down to the river about $1\frac{1}{2}$ mile W.S.W. In no part of the colony have I seen more luxuriant pasture than is to be here met with. The river contains a fine deep reach from 50 to 60 yards across, and the lagoons and holes near its bank are full to the brim. The grass has the appearance of a wheat crop, so thick and high has it grown; which, coupled with the plains on either side of the river, render this as fine a site for a station as could be desired. Lat. $26^{\circ} 54' 17''$ S. Marked this camp XVI. Although two

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eclipses of Jupiter's satellites occurred last night, I was unable to observe them in consequence of the cloudy state of the weather; and there being no moon I could not determine the longitude of this camp, but it is nearly under the same meridian as our position of last Sunday, which was $146^{\circ} 44' 7''$ E.

8th. Considering it a pity to lose so fine an opportunity of recruiting the horses, which stood much in need of rest, I determined on giving them till Thursday (3 days) to recruit. Taking Luff and Harry with me, I rode to a ridge about 2 miles distant from the camp in a S.S.E. direction; but the scrub was too dense to admit of a very extended view. To the westward, forest land appeared to extend as far as the eye could reach.

9th. Taking Welch with me I rode down the river, to the southward, to examine the country. Although I did not reach it, I am convinced that the river, which here takes a tremendous sweep to the westward, returns as much to the eastward, a few miles from our camp.

10th. Sent Luff and Harry along my tracks of yesterday to the southward in search of the river. At 4 p.m. they returned, having, as I had anticipated, come upon the river in that direction, so we shall be saved a long detour.

11th. Continued our journey down the river, keeping a general S. course,

and thus cutting off considerable bends. At 11 miles the river was close on our right, and we ought, perhaps, to have encamped there; but the appearance of the country to the eastward of S. was so favourable, that I was induced to push on in the hope of avoiding a journey to the westward: finding, however, at 12 miles, that we were not in sight of the river, we again had to turn in towards it, and make it in about 2½ miles to the westward.

There are fine reaches in the river at this point, from 60 to 70 yards across.

The night was cloudy. I marked this camp ^K XVII; lat. $27^{\circ} 5' 55''$ S. I observed to-day no less than 5 trees destroyed by lightning in a late thunder-storm, which had filled every hollow in the country. Within a few miles of the river, though no rain fell, a very little fell 5 miles to the southward; the trees were from 30 to 40 yards apart.

12th. Pursuing the course of the river, which we found to be nearly S.S.E., containing a succession of reaches, and having fine grazing land on either side, we encamped at Camp 18, in lat. $27^{\circ} 14' 3''$ S., on a fine sheet of water nearly 2 miles long and 60 yards broad.

13th. Having ascertained that the river took a westerly turn a short distance below our camp, I, this morning, decided on a S. course, which we kept over the most beautiful grassy plains for nearly 20 miles; at that distance I inclined slightly to the eastward, and encamped without water at 25 miles, having a ridge bearing from W. to W.S.W. distant 4 miles on the opposite side of the river. It blew a gale from the eastward throughout the night. This evening about 5 o'clock, before I had deviated from my S. course, I reached a flat falling S., doubtless into the river, and as I had previously taken the bearing of smoke well to the eastward, I now regret that I did not follow it down. My anxiety to find water for the horses, after a long day's journey, induced me to seek the nearest point of the river.

14th. Continued my journey a little to the westward of S., and, at 4 miles, arrived at a pine ridge, which lies parallel with the river. Running down a box flat in order to avoid some of the sand, we at length crossed the ridge, and at 5½ miles encamped on a lagoon near the river, in lat. $27^{\circ} 41' 33''$. Camp 19, 1½ miles W. of 18.

15th. Pursuing a S. course, at 1½ miles we crossed the flat upon which I had touched on Saturday evening, 13th instant; from its appearance I have no doubt it contains water higher up. Travelling over fine grassy plains for 9 miles, I kept a general S.W. course over pine ridges and a small plain until I made the river in 4½ miles; running it down for half a mile, we encamped near a small reach of water in lat. $27^{\circ} 56' 31''$. Young Harry returned from duck-shooting, reporting that he had seen a native peeping at the man who had just before fired a shot. Upon my asking him whether he spoke to the native, he replied, "Bel; that fellow run above when him see me putting in ball belong it gun." It appears that he had at the time only a charge of duck-shot, he therefore deemed it prudent to ram down a ball on the top of it.

16th. Clearing the scrub along the river-bank, we travelled over plains not so well grassed as those of yesterday, for 8 miles, in a direction S. by E.: arriving at that distance on a fine reach of water we encamped, as I wished to make several astronomical observations; the afternoon unfortunately proved cloudy, and so continued. I was not even able to ascertain our latitude, which must have been $28^{\circ} 3'$ or thereabouts.

17th. Continued our journey down the left bank of the river, here divided into many shallow channels, and intersecting a poor and badly grassed country. After a close search, we found a sufficient supply of water by clearing away the sand, and pitched our tents at ^K XXII in lat. $28^{\circ} 15' 44''$. Longitude, as

determined by lunar distances of sun and moon, and \odot , and Abdehoran, being $145^{\circ} 28' 52''$ E. During this day's journey several channels broke off from the river and went to the eastward.

18th. Proceeded over a level parched country, with here and there thick patches of acacia scrub. At 3 miles Harry surprised a young lubru; but although, by hard galloping, we managed to stop her, we could not obtain any information from her, or, indeed, induce her to speak a word; we therefore let her depart in peace, and continued our course. At 7 miles we touched on the river here, a parched bed of sand; following it down for some distance we arrived at a point where its channel most singularly splits into two, the one running due E., the other due W. at right angles to the main channel. Harry having been down the eastern arm in search of water, I despatched Welch and him down the western arm, and halted the party until sunset. At 7 p.m. I moved on slowly, S.E. by S., intending to push on to the Culgoa, in case Welch should fail in his search. At 23 $\frac{1}{2}$ miles we arrived at the eastern arm, running W. to rejoin the other. As the men would require a halt for supper before many hours, I made one answer the two purposes. At 11 p.m. Welch overtook us, and reported that he had followed the river for 9 or 10 miles, and that where he left it, it was reduced to an insignificant sandy bed of no width, not presenting the most remote sign of water. They had passed the junction of the channel upon which we then were, but there was no improvement in its appearance; its general direction was W. Harry, who has a very good idea of the "lay" of a country, said he thought it would shortly terminate. I think it more likely to be the source of some of those shallow pools or lakes discovered by Mr. Poole in this latitude further to the westward. Unable to obtain water in the Warrego, even by digging, at midnight I steered S.E. by S. in the hope of reaching the most western arm of the Balonne. At daybreak we crossed a shallow creek falling to the eastward, and at 7 a.m. found the same creek enlarged, inclining to the southward. A dense smoke appearing in my line of march, I hoped to arrive at water at no great distance. At 8 a.m. we re-crossed the creek near the smoke, and found a plentiful supply of water.

19th. Having arrived at 8 a.m., I gave the horses rest for the remainder of the day. In the afternoon several natives came up to the tents; they were fine men, and appeared disposed to be friendly. They understood the Victoria language, but spoke a different one. Upon repeating a few words of the Victoria, they pointed in that direction, and appeared well aware from whence we must have come: we could not obtain the name of this creek, nor did they seem to know the names Balonne, Culgoa, Narran, &c.

20th. Started for the Culgoa S.E. by S. and S. 37 E., following the creek for about 2 miles, when we left it. It was then diminished; and turning to the eastward, after having passed two sand ridges we entered a box flat and open forest, which, broken here and there by small patches of scrub, continued for 17 miles. The ground was that loose crumbling soil found on the Narran, and which is very distressing to horses. At 17 miles we came to a pine ridge; and at about 20 miles, not having fallen in with any water, I halted until 11 p.m., in latitude $28^{\circ} 39'$. Travelling by moonlight, we moved on through scrub, alternating with pine and brigalow. At daybreak we had made only 9 miles. At 6h. 30m. a.m., finding the horses, especially those in the cart, wearied by so long a journey over such a wretched country, I decided on having them unharnessed, unloaded, and taken on to water. The party cast lots for the two to be left behind; they fell to Mr. Turner and Douglas. After every one had had a pot of tea from the keg, there remained three quarts for the two persons left behind. At 6h. 30m. I pushed on with the horses; one of them was not expected to travel more than a mile, as it was with difficulty we could get him to stand upon his legs.

After boring through the scrub in a direction S. 37 E. we reached a plain at 5½ miles. The smoke we saw yesterday was directly in our front, with detached smokes in a line with it; they all rose from behind a belt of timber, about 4 miles distant on the opposite side of the plain.

Confident they must be in some watercourse, we crossed the plain full of hope; even the poor animals quickened their steps at the sight before them, but we were only hastening to disappointment, and about to enter as dreary, wretched, and worthless a country, as imagination, however excited, could conceive. It was now nearly noon; the thermometer marked 112°, and we were crossing herbless ridges of red sand, bearing nothing but a few stunted iron-bark scrub, and patches of spinifex; these with a brush of poison-wood were in thames all around, adding intensity to a hot wind almost intolerable, and much against the poor thirsty animals, that had barely strength to crawl away from the fire, as it roared towards our flank. At 1 p.m. I left the horses (all endeavouring to obtain shelter from a solitary Kurrajong tree, which was scarcely capable of affording shade to one), and walked to the top of a sandy eminence upon our left. Sweeping round with my glass, the same desolate, terrific-looking country presented itself on all sides.

Returning to the horses, I determined to pursue my course S. 37 E. until we should reach some shade in which the horses could stand till sunset. At 2 p.m. we entered a pine scrub, and halted till 7 p.m., having travelled about 18 miles. As the sun was setting we made preparations for proceeding. Changing the course to E.S.E., we had to bore through a pine scrub. At 3 miles Rattler was reported to be "knocked up," and unable to move any further; he was therefore left, as delay would, perhaps, occasion the loss of many other horses. We just then came out upon an extensive plain, and for a while I entertained a hope that we had entered a better country, and had seen the last of the scrubs; but, alas! having reached the timber on the opposite side, instead of seeing flooded streams, or the sign of a watercourse, brigalow again appeared. Pushing through it, at 7 miles (27 from the carts) we reached a small grassy plain. It was then 11 p.m., and as the horses had eaten nothing for two days, we halted until 2 a.m. At 3 we again moved forward for a short distance through a brigalow scrub, but beyond it, through a long and close pine forest. In the latter we dropped poor old Jack, an excellent cart-horse, and perhaps the most generally useful horse I had. At 3 miles further, Boxer, our best cart-horse, and my private property, was abandoned; but the black horse, that appeared not able to stand before we left the carts, continued to lead the rest, although he took every opportunity of lying down. Having cleared the pine scrub in 4 miles, our old friend brigalow re-appeared. At 34 miles, it being then daybreak, a number of gullard birds flew past us, which gave me great hopes that we were fast approaching the river. At 40 miles, and 20 minutes before 8 a.m., we arrived on the Culgoa, in lat. 29° 25' 41" S., long. 146° 18' E. We had then travelled about 70 miles without water, and had it not been for the unusually heavy ground passed over on the first day and night, and the sandy nature of the country we had to cross in a hot wind, as if in front of a furnace, the thermometer standing at 110° in the shade, we should have brought all the horses through; but these unfortunate circumstances were too much for the cart-horses, after their fatigue in the carts. Having allowed the horses to feed till 4 p.m., I despatched Welch, my lightest man, and Harry the native boy, as tracker, to take six gallons of water in two kegs (3 in each), and tin flasks holding in all another gallon, to the two men left in charge of the carts. For this purpose he rode the chestnut colt, Harry the black colt, and Punch carried the kegs, the only horses then capable of returning. Niblett on Two over Five, and Jaff on Harpy, left at the same time to relieve the two cart-horses left behind with a quart of water from Welch's tin flasks.

23rd. I anxiously awaited the return of Niblett and Luff, whom I expected to bring up Jack and Boxer in the cool of the morning; but about 11 a.m. they made their appearance without either. Jack they had found dead, or so far gone that he could not swallow water poured down his throat; but Boxer had moved from where he had been left, and they were unable to trace him. Having no horses but those I required to convey water to the carts, I was then unable to make any further search. Took a walk to the eastward in the afternoon, and found a miserable flat parched country with patches of mesquite scrub.

24th. My instructions to Welch, before he started with the water, were to make the best of his way to the carts before daylight, and not to delay on the road; but, after having arrived early in the morning, to keep the horses in the shade until sunset, when Douglas and Harry were to return with the empty kegs and tins. I requested Mr. Turner to stay a day or two longer in charge of the property. . . . At an early hour I stationed myself in the best position for seeing furthest down the track, most anxiously awaiting the arrival of Douglas. Should the three colts perform their task, I knew that some of the other horses, with the additional rest, would be able to manage it; but should they have knocked up on the road, how was I to relieve the men 40 miles distant? Had the man marched on foot with water in such weather, he would himself have required as much water as he could carry to assist him to the carts. The case was almost desperate, and if I had never known painful anxiety before, I experienced it then. Hour after hour passed, but no one appeared: out of patience, I had my horse up and rode along the track to meet them. At length, when 4 miles on the road, at about 11 a.m., Luff told me he fancied he saw them coming, and to my joy I soon found that he was right. The poor colts, having been allowed to rest too long during the night, were tottering along, trying their utmost to reach the water they had started from, under a most powerfully hot sun. Refreshed by washing out their mouths, they got on wonderfully well. My mind was now relieved as to the safety of all the men in the party; and I received a note from Mr. Turner telling me that they had 7 quarts of water left when Douglas started, and that he hoped I would not expect them to wait longer than Friday. In consequence of the low condition of the horses, I deemed it prudent to send no officer than was actually necessary. I had in my last journey frequent opportunities of being acquainted with that critical time. It was my intention to have sent Costigan and Wall, the two lightest men, but Mr. Turner expressed a wish that Luff should be one of the men. I determined upon sending them away on Thursday evening, to arrive early on Friday morning. As natives had not hitherto been seen on the river, we did not imagine that they were near to us; but two were observed about 9 a.m. stealing down the bed of the river. Having no fire-arms at hand, I gave an alarm, upon which they made off; but immediately afterwards a hommerang was thrown at me; it fell about 5 yards short of the mark, and was immediately answered by a shot. We heard no more of them.

25th. Passed the day in bivouac under the shelter of boughs; the thermometer stood in the shade at 110°. At sunset Luff and Wall started with water for the carts, taking 6 gallons in kegs and 1 in tins.

26th. Seeking shade most unsuccessfully all day, the thermometer standing at noon in the shade at 112°.

27th. Anxiously expecting the arrival of Mr. Turner and Welch. Circumstances which I will not here detail gave me great uneasiness.

28th. In bivouac on the creek. At sunset I took Douglas, Costigan, and Harry, with 6 horses and 10 gallons of water in the bed, and started for the carts. The night became excessively dark, and we were compelled to halt 2 hours in the scrub; but at 5 a.m. we arrived at the flat, half way to the carts. The heat caused us to travel slowly. A close night and a hot wind increasing that of the day, I was so fatigued I could hardly reach my destination. We

arrived at the carts at 2 p.m., and after an hour's sleep commenced arranging loads for the return. About sunset we started homewards, and had the good fortune to enjoy a drizzling rain for the first few hours. At break of day we reached the flat, and gave the horses a drink and an hour's feed; then moved on and arrived in camp at 2 h. 20 m. A.M. of Tuesday the 30th.

Dec. 1st. Took observations for longitude, which I made $146^{\circ} 15'$.

2nd. Playing at patience in bivouac until the horses regain their strength.

3rd. Taking Niblett with me I started on a due north course for 20 miles, with the view of ascertaining the direction of a tributary to our river. For that distance we were never out of scrub, either brigalow or pine, generally the former. Having reached the latitude of the carts I turned towards the river, which I reached the following morning, 8 miles to the eastward, in lat. $29^{\circ} 11'$.

4th. Convinced that I could not improve upon my first track I returned to camp, keeping nearer to the river, of which the general course is about S.W. by S. We reached the tents at 8 p.m.

5th. In the afternoon the bed was again filled with water, and at 1 p.m. Luff, Costigan, and Welch started with the horses for the carts; Wall accompanied them to bring back the bed from the half-way flat, where they were to water the horses; Harry also went with them. I wished them to reach the flats about 8 h. 30 m. p.m., and by Harry's guidance to be at the carts before day-break, at which time they were to return so as to meet Douglas, who had 14 gallons of water at the flat about 10½ a.m. They were to reach the pine scrub in the cool of the evening, and then to find a fresh supply of water, so as to be at the camp in the early morning.

6th. Wall reached the camp at 5 h. 54 m. A.M., the bed was filled, and Douglas started with it at 7 h. 10 m. A.M.

7th. Douglas, who ought to have been back at 10 o'clock last evening, had not made his appearance at day-break. It was 11½ before he came, Harry having lost the track for the first time on Monday night (6th); they had been compelled to halt 15 miles short of their destination. In consequence of this they were obliged to start at mid-day, and had to toil over the plain and sand ridges in heat sufficient to kill the stoutest and strongest horses. Owing to this they lost 12 hours, and the bed had to be refilled and sent up to meet them.

8th. Douglas returned at 1 A.M. and reported that the horses had been brought forward, but that the carts had been left 5 or 6 miles behind. Boco, one of the leaders, was unable to come on until he had had a dish of water.

9th. Taking about 20 gallons of water I left the camp at 5 h. 40 m. A.M. with Niblett to meet the carts and see the state of the horses. Boco had been left 2½ miles behind; I determined to allow the horses a few days' rest at the river before they attempted the pine scrub and sand ridges. I sent Niblett with 6 gallons for Boco and returned to camp, desiring that the horses should be allowed their own time. I wished to observe the eclipse of Jupiter's 1st and 4th satellites, but Mr. Turner, who had the first watch, called me at 1 h. 10 m. A.M. instead of 1 h. 45 m. P.M. The mean of my observations on the satellites, and the calculation by lunars, gave my long. $146^{\circ} 6' 22''$. It was 12 miles W. of the truth. All the cart horses except Boco and Captain came in in the afternoon, and Luff remained with the latter, 7 miles off, till the evening.

10th. I despatched Mr. Turner and Wall with the bed, containing about 2½ buckets of water for Captain and Boco. Niblett and Wall returned at 2 p.m., telling me they found Boco insensible, and that he died in the night; he seems to have broken his neck by falling whilst attempting to rise from the ground. Captain, they said, would be able to come in if he had a further supply of water, which I sent by Welch, but the poor animal died in spite of it, of fatigue and exposure to the sun. These accidents were in some degree

owing to Harry's losing his way, and the proceedings of the 27th of Nov. I had intended to drive the carts in myself, but was too exhausted to travel on foot, and my presence was needed to superintend the filling of the bed.

11th. This being ration morning, and having 12 lbs. of flour left, I gave half of it to Douglas, telling him to make it last the week. I then served out powder and shot to the sportsmen and sent them out to procure a meal. We had a small piece of bread for breakfast, but for dinner a quart of soup, a pigeon each, and enough bread to lay by a portion for tea.

12th. Being Sunday, we had morning service at half-past 9, before the heat of the day. Had pigeon soup and a pigeon each for dinner; in the evening I had 13 gallons of water put into the bed, and at 7h. 5m. left the camp in charge of three men, taking the rest and all the horses for the purpose of bringing home the carts. At $7\frac{1}{2}$ miles, on a grassy flat, I left the bed slung to a tree in a tarpanin, and at half-past 7 a.m. reached the carts. By the time we had made up packs and loads for the horses and arranged the carts the day broke. Welch, Harry, and I rode 3 miles beyond the carts, to see whether a track spoken of as running off from ours, was one made by the last horses. We found two tracks made by Wall's horses, when returning to camp at night, he having lost his way. As soon as it was light the carts moved on, and before I could overtake them with the pack-horses they were through the much-dreaded pine-scrub, the horses drawing stealthily, although five of the six were acknowledged "gibes." At a quarter to 9 we arrived at the flat, and watered the cart-horses from the bed, which had not lost a drop, and allowed them to feed until a quarter to 11 a.m., when we again started, and reached the camp at 2h. 5m. p.m. having lost six horses, by a series of misfortunes, between the camp and the last water, five of them having been our best cart-horses. We had a pot of tea on arriving and another in the evening, with a morsel of bread each time. I mention our *feasts*, as some of the men fancy they are starving. Although I had no sleep during the last 36 hours, I was glad to take charge of the camp during the first watch, in order that I might be prepared to observe the eclipse of Jupiter's third satellite, at 10h. 54m. I was disappointed, for the only haze which obscured the planet was unfortunately at the time when I wanted it to be clear.

14th. Worked the distance taken last night between ϵ and Mars, the result being 30" more E. than that from ϵ and Sun. We had a quart of soup and a pigeon and a half each for dinner, and the usual portion of bread.

15th. The carts were mounted on their wheels, &c., and preparations made for an early start in the morning. At noon the weather became cloudy, but between squalls and passing showers I obtained sights for time. My watch has gained but one second in the last two days, whereas a few days back it gained 15" daily. Nimrod was put in the cart the first time this evening, and did well. Our dinner-to-day consisted of a quart of soup and two pigeons each.

16th. Left Camp 24 in high glee at being again on the march homeward. On account of my new shaver, I have been compelled to keep the open forest close to the river, and I fear my sketch of the route is not as correct as usual, but I think our course has been E. of S. At 4 p.m. we had a heavy thunder-storm from the N.W., which saturated our tent inside and outside in a moment; the steam caused by the heavy rain on the heated soil was almost sufficient to suffocate us, but we shall feel the benefit of it in a few days if the rain does not imprison us here 17 days, as it did this time last year, when I was on the Mooni. It is a curious coincidence that, about this time last year, or one month earlier, I first suffered severely from want of water and excess of heat, and immediately after was detained most provokingly by too much water. Appearances favour the idea of a detention from similar causes, which, with only 70 lbs. of flour, I can ill afford to encounter.

17th. As the weather cleared in the morning, I determined to start in the afternoon, when the tents and tarpaulins would be dry, a saving of at least 250 lbs. weight to the horses. Harry brought home a pint pot he had found in the morning—a proof that we are approaching the civilized world. At 25 minutes after 12 we broke up our encampment in a heavy shower, and moved slowly towards S.S.E. till 2h. 30m. p.m. I turned eastward to the river, and reached its bank at $\frac{1}{2}$ of a mile.

We had scarcely pitched our tents when the rain descended in torrents. As it was too dark and wet to do anything, and it kept me free from my own reflections on a probable detention, I amused myself reading 'Burke's Reflections on the French Revolution.'

18th. Taking advantage of a temporary suspension of the rain, we moved off at 8h. 55m. a.m., travelling E. of S. for nearly an hour. At this distance the river takes a sharp bend to the westward. Finding a well-beaten native track, I kept it, as it cut off the bends of the river, the general directions of which were about S.S.W. by compass. At 12h. 20m. we encamped on the W. bank of the river. The wind shifted to the southward about 9h. 30m. a.m., and soon brought a clear blue sky. The party saw bullocks' and calves' dung to-day. Our last two days' dinners consisted of two pigeons and a quart of soup each day per man. My watch is 10h. 57m. too fast. Observed the eclipse of Jupiter's second satellite at 12h. 12m. 29s., which gives the longitude $146^{\circ} 30' 30''$, about 6 miles W. of Camp 24; the latitude of this (Camp 25) is $29^{\circ} 44' 57''$.

19th. Our stock of flour and powder being very low, I considered it excusable to travel to-day (Sunday), although contrary to my usual custom; accordingly, we moved off at 6h. 35m. a.m. We kept a native path for two hours, running S.W. and by S. By the fires we saw that a party were on their journey before us; we soon drew within hearing of the guns. At 8 miles we overtook them, but they ran off as soon as they observed us. A guilty conscience must have troubled them; and I suspect, from the bullocks' bones we find here and there, we had evidence of their depredations. At about 9 miles the cattle tracks, although not fresh, were very frequent; as one led along the river I kept it. At 12 miles I crossed the river, and encamped at an old cattle camp, in lat. $29^{\circ} 50' 50''$. No. 26.

20th. Being then further S. than the Barwin, as laid down on Arrowmith's map of 1835, I ventured to take my horses off the Cudgoa, and steer S. for the Barwin. We started at $\frac{1}{2}$ before 7 a.m., and reached the river at 9h. 20m. a.m. I could scarcely credit that it was the main channel we first touched upon, the water being very low, and the current only perceptible in the narrowest and most shallow places. Leaving the carts on the northern bank, I crossed with Harry, and rode about $1\frac{1}{2}$ mile to the southward, not being able to perceive signs of any other channel. I climbed a tree to take the bearing of what I supposed to be Mount Druit, but I saw only tableland, bearing by compass S. 25° W., and Mount Druit E. 5° S., about 5 miles distant. Recrossing the river, we continued our course E.N.E. up its right bank, for $1\frac{1}{2}$ miles, when we came upon a road which we must have crossed before without observing it, and the non-existence of which had much surprised me. Taking the road as the most direct to a station, it brought me into a bend of the river, and what I considered an old encampment of an overland party, as there was a temporary fence across an angle of the river.

The rain having obliterated all the tracks, I, after some search, steered eastward. At half a mile's distance we came again upon the road, kept it for $3\frac{1}{2}$ miles, and turned in upon an angle of the river to Camp 27. Every little incident proving that the country is, or has been, inhabited by a white man, is taken notice of by a party on "spoon diet" approaching a river known to be settled on in part of its course. I first had the pleasure of kindling joy and

hope in the men's hearts, by announcing that our first camp on the Colegon was only 25 miles from the Barwan, and that we should make that river above Fort Bourke, the lowest point to which the stations were said to extend. That announcement put them on the *qui vive*, and sharpened their eyesight. Almost immediately after a bundle of spears were discovered, tied up by a piece of cotton handkerchief. At 25 (next camp) a pint pot was picked up by Harry, in a deserted camp of the natives. The following day *cattle dung* and bones were found. The next, or fourth day, *horse dung*, a piece of calf's skin dropped by the gus in their flight from us, a fragment of a Guernsey shirt, another piece of rag, and bullock bones. The fifth day, the track of a calf that must have passed our camp last evening: more bullock tracks and paths: then the Barwan, on the bank of which I found a broken hobble strap and buckle, which I handed over to be scrutinized. About a mile farther we trod ground upon which white men had travelled before, and had driven teams of bullocks drawing drays, with perhaps provisions on them. Our thoughts naturally suggested what a blessing it would be to fall in with one of them.

21st. Having put the men on the track at Mr. Lawson's marked tree, desiring them to encamp at 5 miles distance, I remained to make observations for longitude and time, and to fix the latitude of the camp as accurately as possible. I overtook the party encamped about 3½ miles to the eastward of 27. Our supper consisted of half a duck and two pigeons per man, and a quart of soup.

22nd. Took up the track at an old stock-yard, at which point, in my absence, Mr. Turner had turned in with the party to the river. At 2 miles passed a station called "*Moussa*." At 7 miles arrived at Mr. Lawson's lowest station on the Barwan, which is the lowest occupied run on that river. Not being able to procure a sufficient supply of flour to enable me to proceed up the Bogan, in which river I am told there is now abundance of water, I rode on 12 miles to Mr. Drutt's station, taking Niblett with me and two pack-horses. There I learned also that flour was scarce; and the next station, belonging to Mr. Henry Cox of Mudgee (Mulgon?), was 6 miles higher on the opposite side of the river.

23rd. Rode to Mr. Cox's station, which is in charge of Edward Bosfield, who said he had extra rations of flour, tea, and salt; and accordingly sold me 150 lbs. of flour, at 25*s.* per ton; 6 lbs. of tea, at 4*s.* per lb.; 30 lbs. of salt, at 30*s.* for 100 lbs. I paid by an order on the Bank of Australasia, having ascertained that the rations belonged to the men. Returned to camp in the evening.

24th. In camp all day, fixing my stations on the map. I found this morning my leg much inflamed from the bite of some insect on Tuesday last, 21st inst. Five or six of my men were therefore despatched in search of leeches, by which the inflammation was reduced.

25th. Left Lawson's station and returned to ^KXXVII, whence I in end to cross over to the Bogan. There was a thunder-storm, with a few drops of rain, in the evening. This makes the third Christmas I have spent on expeditions; one on the Bogan, last year on the Namoi, this on the Barwan.

26th. Shortly after sunrise it was discovered that Harry had departed, with his blanket and blue shirt, but leaving his striped trousers at the camp, as too heavy for him. I at once suspected he had been decoyed by a native of the Barwan we had seen at Lawson's. The weather was intensely hot: but as I had taken charge of the lad from his mother, although only a gin, I considered it my duty to bring him back if possible, and prevent his meeting the fate of two young natives of the Nammon, who, within the last six months, ran from Mr. Ray on this river, and were killed, at a lagoon 1 mile from Lawson's, by the irreconcilable savages of the Barwan. Immediately after prayers I therefore rode, with Costigan, to Lawson's. We tracked the truant the whole way,

and were amused by observing how he had hesitated to pass the grave of a white man who had been killed by the natives, about 3 miles from our camp. Not finding him at the station, I despatched two gins to track him, which they did most cleverly, in places where I could not have discovered the slightest mark. They traced him to the river, where we met some cannibals returning with bark; they said they had not seen him, but had seen his track going to the next station. This was false, for they had spoken to him. I waited till the store-keeper, who was away, came home; he instantly put the gins upon the track again, and they succeeded in tracing him just Lawson's on the road to Drutt's. I arrived at the latter station at dusk, and found my friend Harry seated under the verandah. He was much frightened at seeing me. I told him I was not angry at his being desirous of seeing his friends, but at the act of the fellow who had induced him to follow a road on which he would surely have been killed; and that my only object in going after him was to enable me to return him in safety to the station whence I had taken him; and at the same time I promised to forward him to the Nammol the first favourable opportunity, as I found his desire to reach home exceeded his wish to see Sydney. He had walked 24 miles after leaving the camp, and was passing Drutt's station, when a gin saw him, and tried to persuade him to go to the hut, but, not succeeding, she told the hut-keeper, who brought him in and gave him dinner. It was a bold undertaking to seek to reach the Nammol, a distance of 130 miles, without visiting the stations, and with the certainty of passing through the notoriously cruel tribes of the Barwan. The boy is naturally brave, and of a high and haughty spirit, accompanied, as is usually the case, with a kind and affectionate disposition. He has often said of his mother, "I believe that fellow been boey," a quiet way of expressing his fear that his mother might be dead; and whenever the men mention his mother's name he turns the subject, or looks as black as thunder, knowing how little respect such men have for gins. He has picked up so much English on the journey that he can make himself understood, whatever he wishes to say; and, in addition to this, he has acquired an activity and obedience that would be no discredit to a white boy older than himself. His appearance has greatly improved; no longer a poor child, he has become a tall, well-set lad, with a kind but bold expression of countenance.

27th. Wishing to cross the Barwan to-day, I had the horses tethered, but, owing to some accident, one being tethered on a slope was found dead, with his head downwards. I returned to the camp late, unable to move.

28th. Crossed the Barwan, and, on a S.S.E. course, reached the Bogan in 3 hours; the bed was so shallow that I doubted whether it was that river. I encamped in latitude $30^{\circ} 4' 24''$ S.

29th. Travelled along the left bank of the supposed Bogan, S. 40° E., and in one hour found myself in the track of Sir Thomas Mitchell's drays. His marked line is so plain that we found the track, although made 13 years ago, and travelled along it up to our camp in latitude $30^{\circ} 14' 13''$. There was a breeze during the early part of the day, but the heat in the afternoon was intense.

30th. Took up Sir Thomas's track and travelled the same stage he did to latitude $30^{\circ} 17' 29''$. Saw the first native, a gin, on the river near the track.

31st. Kept Sir Thomas's marked line for about 5 miles, when we lost it. At about 1 mile in a direction S. 30° E., reached the river, which contained abundance of water. Thence I changed my course to due S., and at $\frac{1}{2}$ mile crossed a spur of *New Year Range*; and at about 12 miles from our last camp, came upon the river, containing shallow holes in a very shallow channel, at which we encamped.

Jan. 1st, 1848. Having crossed to the right bank of the Bogan, I proceeded S. 20° E. about 6 miles through forest, and 8 across plains, encamping where the channel is less defined than in any other part.

2nd. Proceeded S. 20° E. for about 10 miles, when I turned in to the river unfortunately at a bend which took me 4 miles out of my road; encamped at a muddy hole, above and below which clearer and larger holes were found.

3rd. Continued S. 20° E. along the W. side of the river; at about 9 miles crossed Sir T. Mitchell's marked line running N.E. At about 13 miles, Mount Hopeless bearing W., I travelled S.E. for the river, which I made at about $\frac{1}{2}$ mile, where it is split into two channels, the smaller being the westernmost, and quite dry. Finding water in the other, we crossed over to it, and encamped. We had a slight thunderstorm in the afternoon, and a clouded night.

4th. Proceeded S. between the two channels. At about 3 or 4 miles we crossed the right one or Bogan, and almost immediately passed Sir T. Mitchell's camp of 21st January, 1846.*

Proceeding at 1 p.m. at 3 miles we came upon our outward bound track on the late expedition (Sir T. M.'s expedition into the Victoria), and at 3 p.m. we encamped just in time to secure dry ground for the tents. The evening commenced with rain from the N.E.

5th. Having encamped upon very level ground, and as it rained all day, we had great difficulty in retaining a space of 6 feet by 2 feet dry enough to sleep on. The weather cleared at sunset.

6th. Detained by the ground being impassable, owing to yesterday's heavy rain.

7th. Started at 9h. 30m. Halted for 1 hour or 2 at Canbelego, where we found abundance of water. In the evening we encamped at Nyngan.

8th. Travelled along Sir T. Mitchell's marked line to Darobel. Punch was put in the traces, and to my astonishment, after his fatigue and unacquaintance with the work, pulled as if he took pleasure in being thus useful.

9th. Continued along the marked line to Muda.

10th. Travelled about 16 miles, and encamped about 2 miles beyond Misery Plain.

11th. Keeping our old route, we halted at Tabritong for 2 hours, and at $\frac{1}{2}$ past 12 o'clock proceeded to Mr. Andrew Ker's station, whither we arrived at 4 p.m.; procured beef, tea, sugar, and 80lbs. flour.

12th. Waited until sunset at Derribong, while the natives ground our wheat. At 7 p.m. reached Mr. Phillips's station, 17 miles, and encamped at 1 a.m.

13th. 14th. Remained in camp.

15th. The carts started at 6 p.m. for Coss's station. The boy and I left the camp with letters, to proceed to Molong. I was misdirected across the river by a man at Coss; and whilst looking for the route we were overtaken by a most violent thunderstorm. We reached Dungan's station at 3 a.m.

16th. Continued our ride. At 9 miles passed Gilmore's station; the proprietor was away, looking for his nephew, who had arrived from Sydney but two days before, and was lost the second evening. At about 45 miles halted at Obley for the night. The station belongs to Mr. Ireland, of the Paramatta road.

17th. Passed through Mr. Terry's station, Buckenbas, on my way to Lee's, on the lake, and arrived in 25 miles. Ascertained that the mail had passed from Wellington. After resting my horse, I proceeded to Molong, and arrived at 10h. 30m. p.m. Mr. Lascombe, the postmaster, kindly opened the bags and inclosed my letters.

18th. Remained in quarters.

19th. Visited the mines and descended the shaft, procuring specimens.

20th. Rode to Mr. Kater's to procure flour and visit the cloth factory. The steam-boiler had burst that morning.

* See Expedition into Tropical Australia, p. 38-40.

21st. Returned to Molong in company with Mr. Kater and Hon. Captain Hope, and proceeded to Mr. Barton's at Boree Nyranng, to meet my party.

22nd. The party arrived at 11 P.M.

23d. Wrote to the cashier of the Bank of Australasia, requesting him to refuse payment of my check in favour of Botfield, he having represented to me in the presence of Niblett that flour was selling in Sydney at 30*l.* per ton.

24th. Proceeded to the heifer station, 14 miles.

N.B. The rest of the journal is occupied by notes on the road to Sydney.

NOTE.—The following specimens, deposited in the Australian Museum, Sydney, were collected in the valley of the Victoria during the expedition, and have been determined by the undersigned.

1. Silicified coniferous wood, of the coal formation.
2. Reddish ferruginous clay.
3. Ditto, with small clear quartz pebbles. | Tertiary of the Desert.
4. Ditto, ditto. |
5. Felspathic crystals in soft trachytic rock.
6. Ferruginous clay.
7. Conglomerate of shining rounded pebbles and fat quartz, in felspathic paste studded with minute particles of crystalline quartz, like that at the head of the Boyne River.
8. Decomposing greenstone.
9. Whitish, argillaceous, felspathic clay? decomposed trachyte.
10. Altered conglomerate, crystalline quartzose base, with pebbles of quartz; a similar rock is found at Merton, on the Hunter River.
11. Finer grained rock of the same kind.
12. Small fragment of composite rock, with quartz and decomposing chatoyant felspar.

W. B. C.

METEOROLOGICAL JOURNAL, extracted from the notes of an Expedition down the River Barcoo (Victoria), under command of Mr. E. B. KENNEDY, with Notes by Rev. W. B. CLARKE.

Locality.	Date, 1847.	Thermometer in Shade.				Winds.	Clouds.	Remarks.
		☉	9 A.M.	☐	3 P.M.			
Gwydir River	May 1	41	62.5	76	79	W.N.W.	Ca. Str.	Encamped on the Gwydir. Close weather, threatening a box forest, clear weather.
" "	2	45	75	79	81	W.	" "	
" "	3	41	53	67	74	" "	" "	
Gwydir and Boomi	4	30	49	70.5	74.5	S.W.	Cir. Ca.	Light air at intervals.
Boomi	5	37	62.5	74	79	Calcu.	" "	Appearance of rain towards evening.
Boomi and Barwan	6	37.5	53	75	83	N.W. S.W.	Ca. Str.	Dull morning, clear P.M.
Barwan and Mooni	7	38	47	73.5	77	S.W.	" "	Fine.
" "	8	43	60	74	75	W.	Cir.	
Mooni	9	39	54	77.5	78.5	Calcu.	" "	
" "	10	36	51	78.5	81	" "	" "	Travelling up the Mooni.
" "	11	34	49	73	82	N.W.	Cir. Ca.	First 3 observations in an open box-forest; 4th, in pine-forest, with sandy soil.
Mooni and Balonne	12	36	53	79	84	W.S.W.	Cir.	
" "	13	42	62	79	81.5	" "	" "	
Balonne River	14	39	60	76	78	N.W.	Clear.	Plains, in box-forest.
" "	15	29	49.5	70	74	S.	Cir.	At Camp B, cool and pleasant.
" "	16	29	51	74	76	N.E.	Ca.	Dew this morning.
" "	17	43	59	71	73.5	S.	Cir. Str.	Evening looking like rain.
" "	18	53	63.5	82	85	N.W. S.W.	Ca.	Unsettled weather.
House and Maranoa	19	34	54.5	73.5	74	E.	Cir.	Light air A.M., sandy soil.
Maranoa	20	33	61.5	75	79	N.E.; W.S.W.	Cir. Str.	A.M. hazy; heavy clouds from W.S.W. in the evening.
" "	21	49	60	72	76	W.S.W. & N.W.	" "	A few drops of rain A.M. & fine P.M.
" "	22	52	58	60	62	W.W.S.W.	Ca. Str.	Heavy rain and 6 in night; drizzling till 3 P.M.
" "	23	36	46	57	59	W.	Clear.	Cool, pleasant day; fresh breeze.
" "	24	25	45	58.5	59	" "	" "	At 6 in open pine-forest; sandy soil.
" "	25	26	45	62	60	W.S.W.	Str.	Gusts of wind during the day.
" "	26	26	52	60.5	62	N.E.	" "	Water frozen at 6 at the camp.

Date	Time	Wind	Force	Direction	Remarks
27	45	52	55.5	55.5	N.N.W.
28	48	52	53	53	N.E.
29	45	54	62.5	61.5	E.S.E.
30	46	54	62	67	S.E.
31	31.5	54	67	68.5	..
1	38	54.5	72	73.5	W.
2	45	50	65	74	W. & W.S.W.
3	24	43.5	53	60.5	..
4	18	39.5	51	51	W.
5	26	42	60.5	60	..
6	30	44.5	63	63.5	..
7	22	39	52	59	..
8	30	45	60	..	..
9	26	..	60.5	62	..
10	33.5	44	63	59	S.W.
11	19	35	52.5	55	W.
12	15	34.5	55.5	60.5	..
13	13	34	56	60	E.
14	15	30	57	59	E. & S.W.
15	25.5	41.5	63.5	65.5	S.W.
16	17	33	72	71	..
17	14	30.5	61.5	60	W.
18	28	40	75	74	E.
19	32	60	75	74	N.E.
20	31	66.5	78	84	W.N.W.
21	32.5	59	71	74	S.
22	60	59.5	66	69	S.
23	31.5	..	57	60	N.
24	43.5	44	46	46	N.
25	42	43	50	55	S.
26	18	44.5	53	60	S.W.
27	16.5	34.5	56	58	..
28	25	36	60	62	W.N.W.
29	15	29.5	58.5	62	N.W.
30	23	58.5	56.5	61	..

Remarks and its tributaries

Heavy drizzling waters of Maracua and Warrego.

METEOROLOGICAL JOURNAL, &c.—continued.

Locality.	Date.	Thermometer in Shade.			Winds.	Clouds.	Remarks.
	1847.	☉	9 A.M.	☉	3 P.M.		
Creek E. of Warrego .	July 1	14	29.5	31	53		
" " " " " "	2	14.5	30	32	54.5	Cu.	Variation 9° 48' E.; frosty morning.
Range between Creek and Warrego.	3	23	35	52.5	56.5	Cir.	Fresh.
Warrego .	4	9.5	20	51.5	53	Cir. Cu.	Dry cold morning.
" " " " " "	5	8.75	38.5	..	55	Cu.	
" " " " " "	6	35	50	55	55	..	
" " " " " "	7	44	49.5	55	64	Cu.	Rain.
" " " " " "	8	35	49	60	52	Cu. Str.	Rain from 3 P.M. to ☉.
" " " " " "	9	33	48	56	54.5	Clear.	
" " " " " "	10	18	44	58	56.5	..	
" " " " " "	11	15	43	54	58	..	
" " " " " "	12	14	43	58	61	..	
" " " " " "	13	18	48.5	60	64	Cir.	
" " " " " "	14	31	60	68	67.5	..	
" " " " " "	15	45.5	52	52	50	Str.	Light drizzling rain.
" " " " " "	16	46	45	51.5	53.5	Cu.	Fine P.M.
" " " " " "	17	27	50	56	56	Cir. Cu.	Variation 10° 14' E.
" " " " " "	18	23	43	61	61	Clear.	
" " " " " "	19	23	40	60	62	Cir.	
Creek 2 miles S. of Mount Playfair.	20	31	42	56	60	..	
Creek 14 miles W. of Mount Playfair.	21	13	46.5	50	..	Clear.	From noon a strong warm wind from W.
Ditto and Nive .	22	23	45	72	74	Cir. Str.	Squally during the night, with hot blasts; strong warm wind during the day.
Nive River .	23	65	69	78	78	Cir. Cu.	Similar weather, but without the hot blasts.
" " " " " "	24	23	55	..	76	..	
Victoria .	24	23	55	..	76	..	

25	44	37	65	S.W.	Clear.	Dull; showers from 3 p.m. to 6 p.m. to 6 p.m. Fine and clear, with bracing wind from S.
26	18	42	76	S.	Str. S.	
27	31	53	82.5	S.E.	Cir. Cu.	
28	44	47	50			
29	25	38	58	Appearance of rain; a few drops fell in the evening.
30	16	44	62	..	..
31	18	43	56.5	..	..
Aug. 1	25	44	58	W. & W.S.W.	Cir. Str.	
2	25	38	64	S.W.	Str.	During these 10 or 12 days, the weather was clear and settled, one day scarcely differing from another. [On the coast there were hot winds and frosts, with irregular barometer, till 11 a.m., when the N.E. sea breeze set in, Venus so clear as to cast shadows. — W. B. C.]
3	26	44	56	N.E. to N.W.	Str.	
4	15	34	37	E. to N.W.	..	
5	17	36	70	N.E.	Clear.	
6	19	37	74	E. to N.W.	..	Appearance of 6, but cleared at 3 p.m.
7	19	37	74.5	..	..
8	22	38	87	..	..
9	28	40	86	N.E.	Cir. Cu.	
10	30	51	65	..	Clear.	Light airs.
11	19	..	73	..	..
12	31	52	78	S.W.	..	
13	30	52.5	79.5	N.N.W.	..	
14	27	40	77	E. & N.W.	Clear.	From 20th to 24th inclusive, the observations were made by Mr. Turner.
15	32	65	79	..	..
16	45	65	79	N.W.	..	
17	35	66	77	E. to N.W.	Clear.	
18	38	67	78	Distant 6 in evening; few drops of rain fell; strong N.E. A.M. [There was strong N.E. off Jarvis Bay same day. — W. B. C.]
19	26	67	79	..	..
20	33	79	85	W.	..	
21	33	75	89	E.	..	
22	49	66	76	S.E.	..	
23	22	55	68	E.	..	
24	22	55	74	N.E.	..	
25	47	47	79.5	..	Cir. Cu.	

METEOROLOGICAL JOURNAL, &c.—continued.

Locality.	Date.	Thermometer in Shade.				Winds.	Clouds.	Remarks.
		☉	9 A.M.	☾	3 P.M.			
Victoria	Aug.							
"	26	46	71	79.5	79	..	Clear.	Strong N.E. after 9 A.M.
"	27	47	71	79	79.5	..	..	Ditto.
"	28	45	74	78.5	79	..	..
"	29	48	74	86	87.5	..	..
"	30	53	77	93	94.5	..	..
Victoria and Desert	31	49	76.5	..	96	N.E.	..	Strong from E. and N.E. [Heavy gale on E. coast of Van Diemen's Land, 26th, 27th, 28th; strong N.E. and N. winds off Sydney.—W.B.C.]
"	Sept.							
"	1	33	62	83	85	N.	Cum.	Absence of other observations, due to want of trees for shade.
"	2	45	67	..	86	..	Clear.	
"	3	45	67.5	85	..	..	..
"	4	52	..	..	..	..	..
"	5	53	68	96	97.5	..	..
"	6	56	..	..	96	..	..	Daily strong winds from E. to N.E.
"	7	55	72	96	..	..	..
"	8	53.5	..	..	97.5	..	Cu. St.	Heavy thunder storm from S.W. at 9.30 P.M. [Rain and appearance of θ at St. Leonard's.—W.B.C.]
"	9	56	..	..	..	..	Cu. Str.	
"	10	46	..	..	..	S.E.	..	Stormy. [Squall at St. Leonard's.—W.B.C.]
"	11	56	77	92	91	..	Cir. Cu.	
"	12	57	77	95	94.6	..	..	Water boiled at 214°; Ther. 64°.
K	13	54	70	83	80	..	..
Ill.	14	54	73	85	84.5	..	..	Distant θ in evening; night fine and still.

Victoria and Desert .	15	52	70	82	83.5	..	..	At 9 p.m. 86°.
Desert .	16	52	65	79	82	..	Cum.	
"	17	52	..	84	86	..	..
"	18	50	70	86	86	..	..
"	19	49	65	80	81	..	..
"	20	53	70	84	86	..	..
"	21	53	..	..	..	..	..
"	22	60	75	90	91	..	Cir. Cu.	
Victoria .	23	55	72	86	87.5	..	..	During the latter part of this month, the winds invariably from N.E. at 8 A.M., shifting to S. in p.m. [On the coast, at Moreton Bay, the winds from N.E. during the day, and S. at night.—W. B. C.]
"	24	54.5	..	..	86	..	..
"	25	60	73.5	..	87	..	..
"	26	52	71	85	87.5	..	..
"	27	50	72	..	88	..	..
"	28	51	69	84	87	..	..	Stormy. [Violent S. gale at Sydney, &c.—W. B. C.]
"	29	52	72	83	..	S.	..	Zodiacal light very brilliant till 8 p.m., apex extending nearly to a Serpents.
"	30	41	65	..	90	..	..
"	Oct. 1	46	72	83	83	N.E.	Cu.	[Feathery cirrous streamers, St. Leon-ard's, 9 A.M.—W. B. C.]
"	2	51	73	84	..	..	..	"Mackerel sky" at 9 A.M.
"	3	50	74	..	86	..	Cir.	Water boiled at 212°-75; Ther. 82°.
"	4	51	72	85	87	..	..
"	5	44	70	82	84	..	..
"	6	46	76	87	87	S.E.	Cu.	
"	7	53	..	93	93	Calm.	Cir.	Fog at 10; hazy all day.
"	8	55	76	93	96	N.	Cu.	Oppressive hazy day.
"	9	52	..	92	92	..	Cir. Cu.	Strong S. wind at 12.
"	10	67	76	90	92	..	..

Locality.	Date.	Thermometer in Shade.			Winds.	Clouds.	Remarks.
		☉	9 A.M.	☉	3 P.M.		
K.	Oct.						
N.III.	11	62	75	90	92	Com.	Bank of clouds all day in S.W.
"	12	55	..	89	90	Cu.	82° at 9 A.M. θ in S.W.
"	13	61	..	89	90	..	Squally weather set in 13th, at 6.30 P.M., with θ from W., cleared at 10 P.M., with wind at E.N.E.
"	14	58	..	86	90	..	Strong gale, and θ at St. Leonard's same day.—W.B.C.]
"	15	56	72	91	94	..	Bank in E. at ☉ clear to W.
Victoria	16	56	78	81	84	Cir	Light.
"	17	56	..	84	86	Cir. Str.	Heavy gale from 2 P.M. to 4 A.M. of 17th. [Rain ceased 4 A.M. at St. Leonard's.—W.B.C.]
"	18	63	78	82	83	..	Fresh breeze all day.
"	19	62	78	82	83	..	Travelling all day.
"	20	..	..	..	..	..
Warrego	21	62	78	82	84	Cir. Str.	[Rain at St. Leonard's 8 P.M., wind varied from N. to W.—W.B.C.]
"	22	62	78	..	..	Cir. Str.	Rain at ☉ and all night.
"	23	62	..	84	82	Cir. Str.	Rain till 11 A.M., θ to N. in evening.
"	24	61	70	72	78	..	Damp sultry day.
"	25	62	78	81	82	Cu.	
"	26	56	..	..	..	..
"	Nov.						
"	16	63	77	87	86	Cu.	
"	17	..	..	..	..	Clear.	
"	18	..	..	..	..	..
"	19	..	..	..	..	..
Ponds							

NOTES TO THE FOREGOING TABLES.

From the 17th to 26th of June are the observations of Mr. Turner. If there are errors in these readings (as at \odot 22nd with S. wind), there are no means of correcting them. Yet, on comparing these readings with my own Journal, kept at St. Leonard's, I find that on 20th June there was there a hot wind and thunder storm, with the lowest barometrical state since 1st Jan. A violent squall occurred at St. Leonard's at \odot ; at Port Stephens at 2 p.m., and 300 miles to E. there was at sea a heavy gale at 7 p.m. The barometers here fell gradually from 14th June. Two barometers in my house indicated a mean of 18 observations that day, 29.518 and 29.118, or 29.164 and 29.029 (corrected). At Port Stephens, Captain King, R.N., at \odot recorded 29.492, and in 34° S. 156° 30' E. the barometer in the Garland Grove showed 29.44.

The observations from 5th to 16th of July inclusive were made by Mr. Turner.

From 19th to 25th July inclusive, all along the E. coast of N. S. W. we had most furious gales from N.W. and W. with great depression of the barometer; trees were blown down, and ships wrecked. As indicating the connexion of Kennedy's warm wind with our gales, the following barometrical means of 18 observations on 22nd July corrected will suffice, viz. 29.010 and 28.814. It was the result of a circular gale from S.E. to S.W. of St. Leonard's, passing to N.E. left to right. The mean of two barometers 22nd (18 observations) was 28.912; 23rd (13 observations) was 28.902; the elevation of this locality is 300 feet above the sea.

The extracts from my own Journal are made to point out how closely the weather in the interior corresponds with that on the coast. There are other very remarkable coincidences not mentioned. I can only regret that there are no means of comparing barometrical readings. Mr. K. has given some instances of boiling temperature. On his return I examined his thermometers—they appeared to me altogether unsuited for such experiments. One of the instruments, the indications of which are recorded in the MS., I rejected, having found it varied several degrees from the one which gave the results in this table. Mr. K. after my examination of them admitted the boiling temperatures to have little value.

The excessive cold at sunrise on various occasions is quite in accordance with the observations of Sir T. L. Mitchell, in the same part of the interior, in a former year. On the 4th and 5th of July, Mr. Kennedy noticed a temperature of 9° 5 and 8° 75 Fahr. Sir T. L. Mitchell had sunrise temperatures of 11° and 12° in May and June 1848, and states in his despatches that "on almost every clear night, Fahrenheit's thermometer fell to 9° , and occasionally at 4 a.m. the mercury was as low as 7° ." Occasionally a temperature of 15° , and on one occasion of 6° , has been registered in June, in the county of Camden.—W. B. C.

I N D E X

TO

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END OF VOL. XXII.



SKETCH
of a route from
TRIPOLI TO GHADAMIS

by
C. H. DICKSON
British Vice Consul
1831

— M^r Dickson's Route
— Route of M^r Richardson North
and Journey to the South in 1830



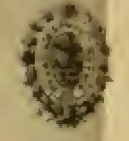


AFRICA.

between 10° & 20° North Latitude

Map

to illustrate the Sources of
Fossil Carbon Dioxide
Mines of Livingston & Dwyer
and
W. Henry Gascoigne Esq.
1852



THE ISLANDS OF
MILO
ANTI-MILO, KIMOLO AND POLINO
CHARTED BY
THE RIGHT HONORABLE JOHN BROWNE
Under the sanction of
CAPTAIN THOMAS BROWNE
1849

Scale of Nautic Miles

Transferred by J. N. C. Walker

ENLARGED SKETCH OF THE
CATACOMBS



WALL OF CYCLOPEAN TOWERS

Remains & Ruins of the ANCIENT TOWN OF MYCENÆ (ΜΥΚΕΝÆ)

By M^r G. R. Wilkinson, R.N.

LONDON: VOL. I. 1846.

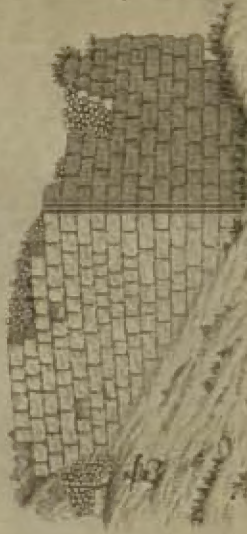


REFERENCE.

- A. Acropolis
- B. Approach gate of Temple of Apollo
- C. Hill of Apollo
- D. Theatre
- E. Approach gate of Temple of Athena
- F. Olympian Temple
- G. House of Athena of Mycenæ
- H. Round Tower
- I. Cemetery in East of City
- K. K. K. Mycenæ walls
- L. Lion
- M. Foundation of a large Building



ROUND TOWER

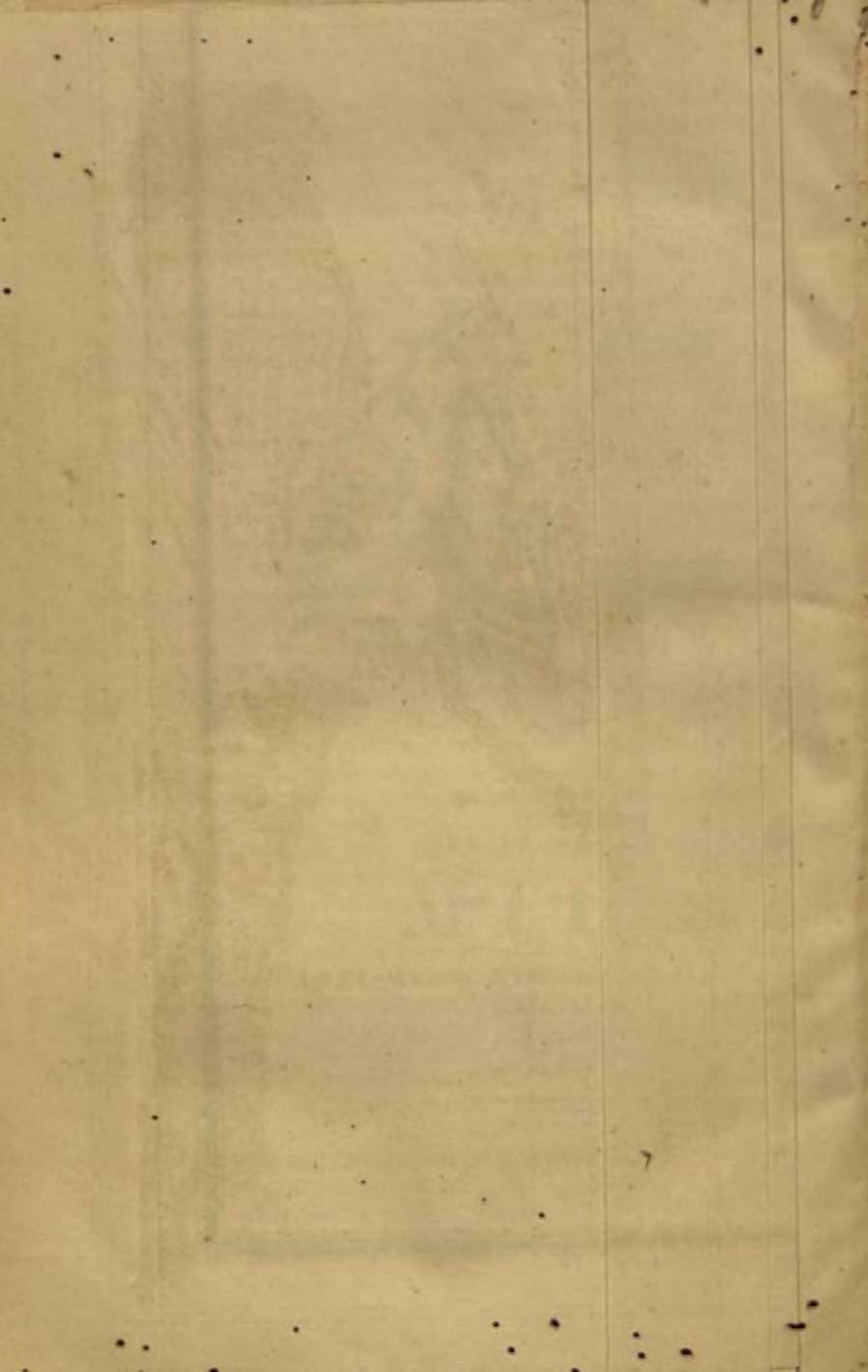


WALL NEAR THEATRE

Map to Illustrate the Journal
of a Route along the
RIVERS VICTORIA & WARREGO.

AUSTRALIA.

*Map to Illustrate the Journal
of a Route along the
RIVERS VICTORIA & WARREGO,*
By
E.B. Kennedy Esq.
1847.



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